

THE MINING AND METALLURGICAL JOURNAL.

FORMERLY THE PACIFIC COAST BULLION.

Vol. XVI., No. 12

LOS ANGELES, CAL., MARCH 15, 1897

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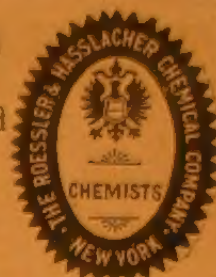
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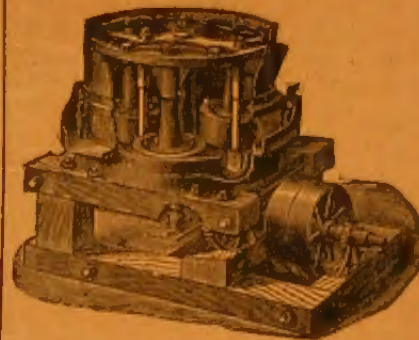
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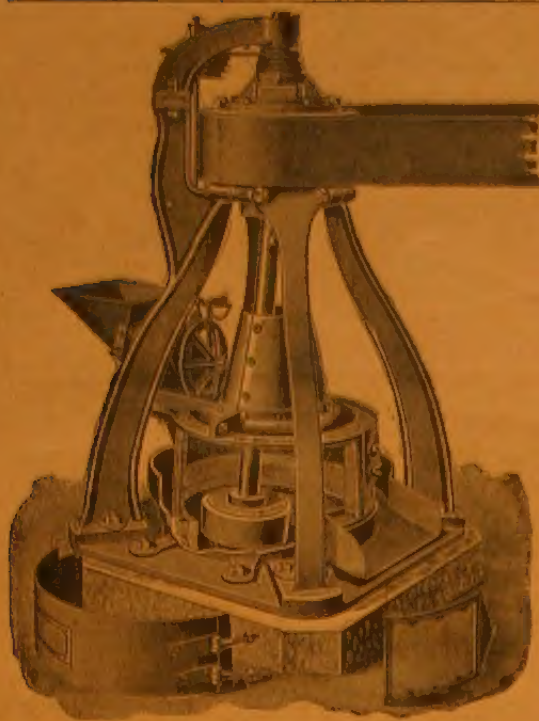
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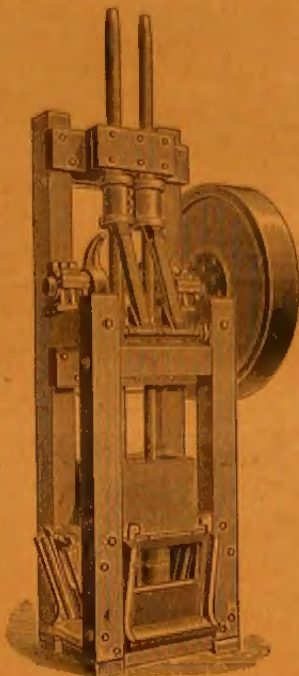
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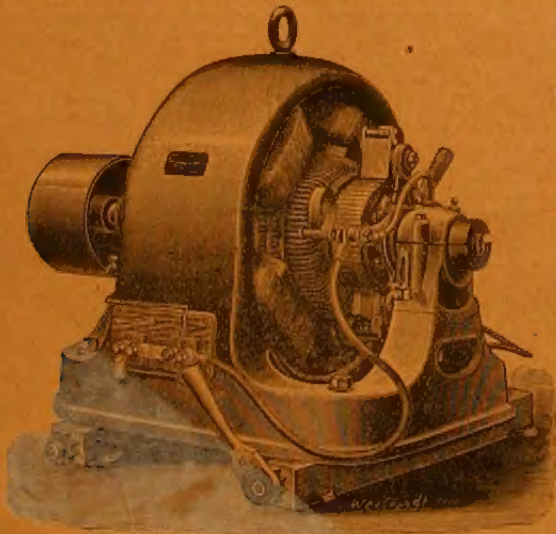
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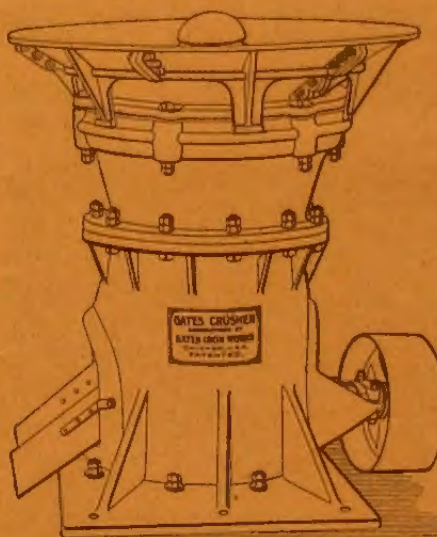
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VOL. XVI. MARCH 15 No. 12

F. W. EDELSTEN, Editor.

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ULRICH KNOCH, Publisher

OFFICE, Stimson Block, Los Angeles, Cal.

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THE INAUGURAL.

Mr. McKinley has been as specific as any of his predecessors. On the tariff, reciprocity, immigration, free schools, and trusts his views are clearly and emphatically expressed, and they will receive general approval. In regard to the tariff, however, it may be expected there will be a contest on old partizan lines.

The money question will be the chief bone of future contention; and it was hoped that on that subject his position would have been more specifically defined. On some points, however, he expressed himself very clearly.

He pledges himself to do all in his power to bring about an international agreement in regard to the coinage of silver and its uses as a money in international trade that the Republican platform commands.

He committed himself against reduction of the volume of circulating medium. So far so good; but it would have been a satisfaction to a very large majority of the American people if he had pledged his efforts to an increase of the volume as the growth of population, production and domestic commerce shall demand.

THE CALIFORNIA STATE MINING BUREAU.

The State Mining Bureau is an institution worthy of even greater support than is afforded it by the State. Its publications have advertised the mining resources of California far and wide, and are in a form fit for preservation and reference so that they are by no means ephemeral. The main reports treat of the mineral resources of each county separately, and the working mines are all named and described in alphabetical order so that any one may readily find what he wants. More-

over, references are made to pages of former reports, by which the history of any mine may be traced by those interested in it. Not only gold and silver mining but all branches of the mineral industry receive attention. Separate chapters are devoted to petroleum, borax, chrome, manganese, quicksilver, structural materials, etc., and the localities where all these things occur are noted and described. Through these means those interested in any particular substance may find the place of its occurrence and learn just what is being and has been done in connection with it. In all this work no county is neglected, but each one is visited by the field assistants and the resources impartially described.

That such publications, prepared under official direction, do good to the State and to the mines, goes without question. The newspapers record the weekly or monthly current progress but are not apt to be preserved as are the publications of the Mining Bureau.

Moreover, the Bureau Reports are in very great demand in other States and abroad and exercise great influence in attracting outside capital, which is so badly needed in mining operations in California. The Bulletins issued by the Bureau in the past few years have been of inestimable advantage to the mining community in the State, treating as they do of subjects of every-day interest to the miner in his work. Those on "Gold Milling Practices," "Mine Timbering," "Mine Drainage," "The Cyanide Process," etc., have been very much in demand among gold miners all over the world; and those on the oil and asphalt fields of the State are valuable to persons engaged in those important industries. The annual statistical bulletins give us an opportunity to compare the economic results in the various kinds of mining by counties from year to year, and are the only ones of the kind published in any of the States. Taken altogether the work of the Bureau is to be highly commended in every way. Over 55,000 copies of the reports and bulletins have been distributed, by request, in its past two years.

The Legislature has appropriated the same sum as last year—\$25,000 per annum for two years, for the support of the Bureau. This amount is none too much, and, in fact, should be \$5,000 more. The Field Assistants receive \$150 per month and their traveling expenses, but on their return from active field work each year ~~are~~ laid off without pay for from four to five months because there is not sufficient money to keep them on the payroll. As a result their monthly pay the year around is very much less than it should be taking into consideration their experience and skill in their work. With an additional five thousand dollars the mineralogist could keep his men longer in the field, give them more time for their special investigations, and let them have opportunity for working up their field notes when in the office in the winter. As it is now they must work up their notes evenings when in the field. More room is needed at the museum and more office assistants.

It is a notorious fact that of all the State Bureaus or Commissions the reports of the Mining Bureau are most in demand, those of the Horticultural Commission coming next in importance. When last year the requisition for 10,000 copies of the Bureau report was made the Board of Examiners ordered an extra thousand copies for the Secretary of State's office, at that official's request, in view of the constant demand for these reports. This is the best indication which could be

given of the importance of this Bureau to the people of the State. As to the Bulletins, people constantly write for them, not only from other mining States of the Union but from the Australian colonies, British Columbia, South Africa, different parts of South America, and, in fact, all over the world. It has been found necessary to print a third edition of certain of these bulletins.

These being the facts concerning this important State institution it should be given the very best of support, since it is certainly a credit to the State and has given California a reputation wherever mining is carried on. The miners themselves, for whose benefit it is maintained, should aid the Field Assistant in every way in procuring information. No one should refuse them admission to their mines, for they are not desirous of prying into any ones business affairs, but only seeking such descriptions as will interest the general public. It is not at all to the credit of any mine to see mentioned in the report, "Information about, and admission to, the mine refused." This surely does more harm to the mine than to the Bureau, which latter has done its duty by making the inquiry at least. People think a mine must be "shaky" in some way if a State official is refused admission or information. Miners will find this out if they try to sell a mine after such a notice of it is made in the Bureau report. The mines in the various districts of the State should do everything in their power to assist the Bureau in its investigations. Just now, for instance, the Bureau is sending out statistical blanks asking as to amount of product and values for the year 1896. These are sent to all mines but those of gold and silver, the Mint collecting the information about precious metals. Some mine owners neglect or refuse to answer these inquiries, fearing their private business will be made public. Nothing of the sort is done. Only the aggregates by counties are used, and the resulting table of mineral statistics of the year is exceedingly valuable. No names of mines or owners are given so no one may trace the source other than by name of county. These inquiries should be answered promptly by all mining men.

We are certainly very glad that the attempt to turn over the Mining Bureau to the State University, or remove its museum to the Golden Gate Park, wholly miscarried. It was backed up by some people and papers which should have known better. Mining is just at this time the most important and profitable of our home resources, and bids fair to become of even greater importance within the next few years. This institution, representing as it does, the mining industry, needs really better support than ever before and should be encouraged.

Southern California has been complimented by the appointment as State Mineralogist of Mr. A. S. Cooper, of Santa Barbara, this being the first time the office has been filled by a citizen of this part of California. Mr. Cooper takes office on the first of April and will hold it four years, succeeding Mr. J. J. Crawford, of Placerville, whose term has expired. Mr. Crawford has done first class work during his term of office. His administration has been a credit to him and all concerned, and he has brought out the best set of publications ever issued by the Bureau. Mr. Cooper is an experienced man in asphalt and petroleum, substances of the greatest interest to people of Southern California, and he has had experience in precious metal mining as well. It is probable he will have very thorough investigations made in the desert.

and mountain mining regions of Southern California, now assuming greater importance than ever before in view of recent discoveries and developments. This can be done, of course, with due regard to interests of other sections which have been more thoroughly exploited in the past. But he can select among his assistants some man from Southern California who may make his headquarters in this part of the State, so as to avoid the expense entailed in sending men down from San Francisco every time anything is to be hunted up.

The corps of assistants in the Bureau is an experienced and skillful one, and it is not probable that many changes will be made in the force. This, of course, is a matter for Mr. Cooper to determine. However, it has not been the custom to make many changes on political grounds, most of those in the Bureau having been selected for special fitness for their work rather than for political reasons. Without specially fitted assistants Mr. Cooper could not expect to make a success of his administration, and he is altogether too conservative and experienced a man to make any mistakes on this score. Most of the assistants have kept their places through several administrations.

Mr. Cooper is to be congratulated on assuming his important office at a time when the industry he represents is in a remarkably prosperous and growing condition. It will give him an opportunity to make a good record not only for himself but for the section of the State which he represents.

• THE DESERT MINES AND THEIR FUTURE.

(Written especially for the MINING AND METALLURGICAL JOURNAL by F. M. Eddlich, E. M.)

Few persons who have heard of or traveled across a portion of the "Great American Desert" have any conception that this despised portion of our domain will, in time, prove a veritable treasure-box for those who have the courage and perseverance to apply the key to the lock. Only within the past decade some decisive results have been achieved, although tentative efforts, many of them ending disastrously, were timidly made more than thirty years ago.

For the benefit of those who have not come into real contact with the "desert" and its wonderful resources, a brief description of the latter may be of value. It will complement, in a measure, the data given in this issue of the "Mines of Randsburg," which pertains more in detail to localities that have become prominent within the borders of the arid region.

The area properly ascribable to what is generally known as "The Desert" is equal to several of the medium-sized eastern states, and is located almost entirely in Southern California. In a general way it may be said that a large number of regular, narrow mountain ranges, trending northeast and southwest, traverse the entire region, being separated from each other by valleys of varying width, singularly uniform in their appearance. The peaks of the ranges reach relative elevations, amounting to perhaps 2000 feet on an average.

Structurally, these mountains are rugged, steep, cut by deep canyons and gorges, and often rather difficult of access. In rare cases only do they show vegetation beyond the size of shrubbery.

Speaking broadly, it may be said that the majority of the ranges are composed of metamorphic material, largely of schistose char-

acter, of granitic and pegmatitic rocks. These in turn are traversed and broken into by porphyritic, trachytic and allied eruptions. Vast accumulations of drift, some clearly of glacial origin, cover the valleys and portions of the ranges.

Ore deposits are not confined to any one of the formations. At some places, the metamorphic rocks contain them, at others the eruptive. Not infrequently does the drift material prove to carry large quantities of gold, while ancient and modern lake-beds furnish alkaline and saline compounds.

It would lead too far to refer in detail to the districts which are now known to carry minerals and metals of commercial value; suffice to say that the Desert produces gold, silver, lead, copper, magnetic and hematitic iron, cobalt, antimony, salt, borax, alkalis of various constitution, clays and bituminous products.

Quartz mines occur in sufficient quantities and richness to have induced the establishment of flourishing camps, prominent among which is Randsburg district, with its population of nearly 4000 souls, all of which have turned thither within the year just passed; rich placer ground has also been found in many places.

Beyond these, the leading product of the Desert has been borax, for which it has been famous for a long time past.

It may sound paradoxical to speak of "advantages" in a region which, among the vast mass of the uninitiated, is held in dread and fear. Yet there are advantages and they are of a nature which appeal directly to the pocket-book of the investor, that most delicate barometer of his appreciation of the good things of this earth.

Prominent among the features which commend this region is its accessibility. Two great railroad lines now skirt portions of this area and, in part, cut across it. A third will probably soon reach southward from Salt Lake City and open up additional ground. The distances from the main lines to the camps already established are in no instances very great, nor ore sections which give promise of future development very far removed therefrom. A conservative policy of branch lines would speedily connect the districts whose output warranted their construction. Orographically the ground offers neither serious obstacles to such construction nor is it such as to call for any unusual outlay. The building of railroads at many places would involve but little more than the laying of track.

Meanwhile excellent wagon-roads lead from several stations into the very heart of the country under consideration. Transportation, therefore, may be considered as offering no appreciable obstacles to the future developments.

Another inestimable advantage lies in the dryness of the climate and the mines, the shortness of the rainy season and the comparatively low altitude, all combine to produce features favorable to the miner. Such features are evidenced in the fact that he can safely count upon being able to work every day in the year, without fear from snowslides-flooding of his workings, interrupted transportation, etc., and his ordinary living expenses will consume a far smaller proportion of his hard-earned wages than would be the case in a harsh, northerly climate. In the matter of buildings and conservation of machinery, also, this plays an important role. Practically, all the protection required consists of a roof to shed the sparse rainfall, as far as machinery is concerned. Dry air mov-

ing steadily along the surface is eminently helpful in the conduct of even the underground workings. It prevents slacking of the ground and assists in preserving timbers in the mines.

An apparently serious drawback is encountered in the scanty supply of surface water. Springs are encountered from time to time, but some of these are brackish or alkaline, unfit for domestic uses. Truly, for the individual prospector the scarcity of this indispensable commodity is a hardship, and scores of ill-fated wonderers, even entire companies of immigrants have paid with their lives for insufficient knowledge of the country or disregard of friendly advice. But the same thing has occurred at many other points where today there is an abundance of water. Individual, sporadic and ill advised labor can accomplish but little in the way of producing an adequate water supply. But the discovery and operation of paying mining districts and the aggregate work of a community will soon overcome the difficulty. There is no doubt whatever but that water of suitable character can be obtained at very nearly all points in the desert. On the other hand, experience in similar regions has taught that the advent of man, with his railroads, his telegraph lines, his blasting, smoke producing and his irrigation eventually changes climatic conditions. All of these beneficial changes may confidently be expected to take place in the desert in due course of time.

The work of the prospector in the desert is now well under way and new discoveries may be looked for. The work of exploration indicates the trail for capital to follow, but it is this potent factor—capital—which must furnish the magic key to unlock the chest in which treasures lie hidden, so vast in amount that, at present, their value can only be suspected. The path has been pointed out, the attention of the world has been attracted to the spot and it can be a question of but a short time until the work of pioneers will be superceded by the more remunerative labors of the systematic miner. Money is required to develop the desert resources quickly and fully. If the capitalist will not interest himself therein, the miners, themselves, are fully rich enough to furnish what is wanted, but progress will then be somewhat retarded.

There are no obstacles to be encountered that cannot be easily and speedily overcome. There is no drawback to the desert mines that is not multiplied tenfold in the mines of the cold, high, mountainous regions of the far north. As a matter of fact, the advantages of working on the desert have not, as yet, been understood, but the day is not far distant when they will receive ample recognition.

The Machinery Supply Co. firm have dissolved partnership. C. B. Boothe, who is so well and so favorably known in Southern California, will continue business at his new location, in the new Howell Block, 126, 128 S. Los Angeles st. He will have double the floor space of that formerly occupied on Broadway. The services of F. H. Johnson, of Denver, formerly connected with the Denver Engineering Works Co., have been secured by Mr. Boothe. Mr. Johnson will assume entire control of the mining machinery and supply department. He comes from Colorado with the highest recommendations, and will aid materially in making Los Angeles a headquarters for mining supplies. C. B. Boothe & Co. will carry a full line of everything needed by the miners, and hope for the liberal patronage bestowed in the past.

The Mines of Randsburg.

Probably no district in which mineral has been discovered for the last ten years has been more widely advertised than Randsburg, and in spite of some reports not entirely favorable to the district, it has grown until over 1600 locations have been made, 1100 of which have been recorded. On Feb. 15, 1896, nineteen transfers, relating to Randsburg, were recorded in Bakersfield, the county seat of Kern county. While the location may seem rather inaccessible to the newcomer who has had little experience in mining camps, compared to Tombstone, Arizona, Virginia City, Nevada, and Leadville, Colo., when they were discovered, it has every advantage. A trip to Tombstone in 1879 meant a long stage ride, which was very expensive; it meant all kinds of exposure and privations, if not death at the hands of the Apaches, who infested the territory in those days. The hardships that were undergone by the pioneers of Leadville and other Colorado mining camps are too well known to need any description. We are familiar with camps in Mexico whose indications were apparently no better than Randsburg, where it is necessary to pack machinery and supplies more than 200 miles on the backs of mules and carry the bullion a like distance to a shipping point on the railroad. It would be an easy matter to enumerate a large number of prosperous mining districts which are far more inaccessible than Randsburg, and, in fact, we know of few which can be reached with as much comfort and in so short a time from the railroad. From Kramer, on the Atlantic and Pacific road, two four-horse stages are run daily. The line is operated by Messrs. Denair, Crandall & Co. The fare is \$2.00 one way. This is the favorite route, being but twenty-six miles. The stages meet the trains and make the trip to Randsburg in about three hours. From Mojave, which is forty-eight miles, three daily stage lines are operated, one being a six-horse, one a four and one a two. The fare is \$3.00 one way. The rates for hauling freight are very low. From Kramer, in car-load lots, \$5.00 per ton is charged; in less than car-loads, 30 cents per cwt. From Mojave the rate varies from 40 cents to 80 cents per cwt. We were informed by Mr. P. J. Hartt, the agent of the Atlantic and Pacific railroad and general agent of the Randsburg and Kramer stage and transfer Co., that 130,000 lbs. of mixed freight was brought from Kramer on the Kramer and Randsburg stage and transfer Co.'s teams in twenty-four hours from Feb.

11th to Feb. 12th. Randsburg has a daily mail, two telephone lines, a telegraph line, a good weekly newspaper, the *Randsburg Miner*, edited by Geo. W. Glover, Jr., formerly of Pasadena, Cal., three assayers, four mining engineers, a mining exchange, operated by Messrs. Fugard, Ragsdale & Langdon, several hotels, a number of general stores, two drug stores, restaurants, and, in fact, every line of business is represented, some of the stocks carried being large enough for a place of 20,000 people.

The population of the city of Randsburg is variously estimated from 2500 to 4000. In September of last year where the thriving town now stands there were but a few tents. While there is no doubt that the scarcity of work in other places has driven many people to Randsburg, the mineral development seems to justify the building up of a

portunities for making rich discoveries are probably as good as in any other portion of the world. It is generally supposed that the value of the mineral around Randsburg was only ascertained a few years back but this idea is erroneous, as the early history of the camp proves that the existence of rich lodes was known many years ago, but the disadvantages were so great that only a few venturesome prospectors found their way across the deserts, and they did not stop long enough to do more than make locations. A location notice, dated 1853, was found just west of the present site of Randsburg, also an old pair of gold scales. The name on the notice was Hiram Johnson, and eight miles from the present town two prospectors in Feb. 1894 unearthed a fireplace from which they took a black whiskey bottle, which contained \$6.20 in gold dust, they also found pieces of

ollas. Another discovery that proves the district was known years ago, was the finding of a can near Fremont's peak, eight miles south-east of Randsburg, with a location notice inside which was made out according to the old California mining law. The date, which was still legible was 1858. In 1870 John Burnett, who is now a partner of Judge Shaefer in the Gold Basin mines in White Hills, Ariz., is said to have located the Olympus mine, which is now a part of the Rand group.

North of Randsburg, in what is known as the Rademacher district, a New York company spent \$200,000 about thirty years ago. Quite a camp was established. Thirteen

tunnels were run from 80 to 300 feet in length and a number of shafts were sunk, while two miles north of the New York Co. an old Chilean worked an arastra with burros, and is supposed to have had a very rich mine, which a number of prospectors have recently been looking for. The water from the tunnels of the New York Co. have been of great benefit to the miners and prospectors as well as to Garden station, located a few miles from the tunnels, where a fine garden and orchard flourish in the heart of the desert.

Eight miles north of Randsburg is the Summit district, which was discovered by the Van Slyke Bros. in Nov., 1893. Some three hundred men were attracted by the rich ground and a large amount of gold was taken out in dry washers, and at the present time the deep diggings are being worked. Mr. Searles, of the Boax works, also owned and operated a silver mine near the Rademacher district years ago. We were informed by an



RANDSBURG, KERN COUNTY, CAL.

substantial town somewhere in the district. Water from Garlock, which is hauled ten miles, is sold for \$1.25 per barrel; from Riggs' well for \$1.50 per barrel.

There are nine custom mills in and around the district, six being at Garlock, one at Mesquite Springs, one at Koehn Springs and one at Cutterback Lake. The combined capacity being about 125 tons in twenty-four hours. There are several localities, distant from five to fifteen miles from Randsburg, which are being vigorously prospected and from some satisfactory results are being obtained. A stepping-stone to the desert has been made by the discoveries around Randsburg, and it will lead to a thorough examination of the most remote parts of the vast area of desert country in Kern, Inyo and San Bernardino counties, and the prospector will have the satisfaction of knowing that he is entering a territory not much better known than the heart of Africa, and where his op-



RAND TUNNEL

old timer on the desert that he had found Indian pottery east of Randsburg and that there was no doubt but that the Indians washed out the gold and used it as a medium of exchange. The town of Goler, which has been the headquarters for the dry washers for eight or ten years past, is only twelve miles west of Randsburg. From these facts it can readily be seen that there was life on all sides of the present excitement, and it was only the fact that placer mining was found more profitable and involved less expense than quartz mining that prevented the discovery of the mines that are now making the district famous. The last few years forms the connecting link between the uncertainties of the past and the brilliant successes of the present, as the real history of Randsburg begins with the location of the Rand group of mines in 1895 by Messrs. Burcham, Singleton & Moore, who came over from Goler in search of ground to work with dry washers, they started in the gulch at the head of what is now Rand street in Randsburg and worked to the top of the mountain and there discovered the Olympus lode. Their dry washing netted them \$20.00 per day to the man. In a few months there were 30 dry washers working around the Rand group of mines and all making money. In the fall of 1895 the Rand group was worked in a small way and ore was shipped to the Selby Smelting and Lead Co., which netted \$48.50 per ton. A great deal of ore has been taken out since and milled.

Closely following the Rand group came the discovery of the Kinyon, Wedge and Butte mines, in April 1896. The Kinyon by Kinyon & Sons; the Wedge by Thos. Kerns and the Butte by the Ramey Bros, Summers and Tate. By this time the fame of the district had reached all parts of the country and by the summer of 1896 the people commenced to flock into the camp and in an incredibly short time a town sprung up which, although not the largest, is certainly one of the liveliest mining camps in the state of California.

The geological formation of the district is bound by nature to form a very interesting study to the mining man.

It is impossible in a short article to cover the whole of what is termed the Rand district. In consequence, we will confine our description to the section north and east of the town of Randsburg, including therein the Stringer, the Val Verde and the Rand districts proper.

The formation proper is syenite, (or altered granite) schist and porphyry.

In looking from the Rand Hill, facing in an easterly direction towards the Red Mountain, the chain of granite peaks and outcrop-

pings can be very distinctly seen dividing this section in an easterly and westerly direction.

Looking in a northerly direction, the ore channel, reaching in a northeasterly direction, can be seen for some six or eight miles; then, turning almost due north, passing over a low set of hills and undulating ground into the valley below. Turning to the east, the other branch of the ore-bearing zone can be traced towards the stringer, the St. Elmo and the Fremont's Peak sections.

These channels are confined on the north and south by the granite, and average in width from three to eight miles.

The schists form the country rock of these channels, abutting on the granite outcroppings, at an angle of from 25 to 45 degrees, those on the west of the main granite upheaval dipping to the west and those on the east to the east.

The general trend of the veins in the Rand section proper is in a northerly and southerly direction, being paralleled by a series of porphyry dykes, of which more will be said later on. The dip of the veins is with the dip of the schists. The veins average from two to eight feet in width, and form the most reliable sources of information obtainable. The ores carry values in a free state of from \$15 to \$60 dollars.



KINYON MINE

The veins in the "stringer" country have an easterly and westerly trend, having their own system of dykes running in the same direction.

These stringers seem to be feeders or small feathering veins between the larger formations that pass through this section in the form of "bull" quartz veins. It will be interesting at some future time, when more work has been done, to see what effect the intersection of these stringers with main veins will have—there is, of course, a fair possibility of large bodies of pay rock being found at the intersection.

The dip of the veins in this section is not far from a perpendicular, and pass across the formation of the country.

The best information in regard to the ore is that it mills from \$50 to \$120 to the ton.

The values of the ores in this section seem to be much higher in general than on the Rand proper, but the quantity is not nearly as great, as the veins only average from three to eighteen inches in width, although they may increase in depth. This part of the the country is what might be called the poor man's section, as the properties have paid from the surface at a very small expense for mining.

The porphyry dyke movements and their relation to the ore bodies of the Rand will in

the near future, no doubt, when sufficient work has been done to demonstrate this relation prove the key to the successful finding of the pay ore on the veins here located. Their prominence and close proximity to the pay ore of this section, and the frequency with which these dykes are mineralized, tends to prove this idea.

The dip of the dykes is considerably greater than that of the veins, and, in consequence, the veins at a depth sufficient, which in most of the mines has not been attained, must of necessity cut the dykes or straighten on them and follow them down. This is a point that has not been fully demonstrated, although in one or two properties where sufficient depth has been attained to at least encounter the first dyke, the veins have cut through and increased in width on the lower side. In this case the veins have not varied in dip to any appreciable extent.

The St. Elmo district, which has yielded a large amount of rich ore, is lying on the line of contact between the granite and schist. Along this line of contact, above the St. Elmo near the stringer district, there will undoubtedly, be valuable discoveries made.

In describing the mines of the district, due allowance must be made for the small amount of development work done, which makes it very difficult to give more than a general idea as we found it.

THE RAND GROUP

Consists of ten claims. The Olympus is the main lode, the Rand, Trilby and Yellow Aster are the most developed. The Olympus, which is on the apex of the mountain, has one incline shaft, 125 feet deep, equipped with a hoist. There are several cuts also dritts in the shaft. On the Yellow Aster is a tunnel 300 feet long. The Rand has a 75 foot shaft, and the Trilby one tunnel and other development. Considerable work has been done on the other claims. All the sides of the mountain have been worked with dry washers. The property is said to have produced over \$100,000. It is owned by Messrs. Moore, Burcham, Singleton and Reddy. The mine has been favorably reported on by several experts; but it has been in litigation nearly since its discovery. It would probably be the best property in the district for a large company to operate, as there is a large body of ore that would pay to work with a mill on the ground.

THE KINYON MINE

Has been pronounced by many to have the largest body of high grade ore in sight of any mine in the district. It was discovered by the present owners, Messrs. Kinyon & Sons, on April 2nd, 1896. The vein dips at an angle of 45 degrees. The main shaft has



WEDGE MINE



UNDERGROUND VIEW OF ORE BODY IN WEDGE MINE

been sunk 135 feet deep. There are two drifts from the 70 foot level. The east drift is 100 feet long, with a winze of 50 feet deep. The west drift is 20 feet long. The vein, which was only four inches wide on the surface, has widened to four feet in the bottom. A 53 ton shipment was recently made to the Koehn mill, which averaged \$116.00 per ton in gold. The ore at present is being shipped to Garlock for treatment. A horse power whim will soon be erected, and the main shaft will be sunk deeper immediately—5 men are employed. Mr. George Kinyon is manager. The next property on the east is

THE WEDGE,

A fraction between the Kenyon and Butte, the claim runs to a point on the south of the shaft house, and assumes its maximum width of 300 feet on the north side, 350 feet from the shaft house. The main workings have attained a depth of 165 feet. At the 115 foot level, 75 foot drifts have been run east and west. At the bottom of the main shaft, two drifts, each 50 feet are now being worked. On one side some stoping has been done. The width of the vein is $3\frac{1}{2}$ feet, with a pitch of 72 degrees, and, as depth is attained, the width of the ore body increases from the side lines. The mine was bought by J. W. Rogers, on Nov. 1, 1896. Messrs. Allen, Pepper, Walker and Rogers now own it. The property is being worked in a business-like way, with three eight-hour shifts. They employ 18 men, have a substantial ore house and horse-power hoist. From Nov. 15th to Jan. 24th, 400 tons of ore were shipped, the average value of which was \$60 per ton. The owners are now incorporating the mine. They are also working a group of 13 claims, three miles east of Randsburg, on which they employ 11 men, they have several open cuts and tunnels, and a shaft 75 feet deep, in which they are prospecting for water.

Mr. J. W. Rogers is general manager of the Wedge, and under his management the mine, although only a small fraction, has paid well from the start, over \$15,000 having been taken out the first two months of their operations.

THE BUTTE MINE.

Joining the Wedge on the east, is one of the large producers of the camp. Its discovery dates back one year, and since that time it is estimated that \$70,000 has been taken out, mainly in development work and some open cuts. The main shaft is 150 feet deep. At 100 feet, a cross cut has been run north 100 feet, to connect with an air shaft, at 140 feet,

another cross cut is in 18 feet, running south. At the 100 foot level, there is a drift 60 feet. The shaft is well timbered, and equipped with a Davis' hoist.

Last July, an open cut was made, from which 12 cars of ore were taken that netted \$16,000, some of which was shipped to the Selby Smelting and Lead Co. 200 feet east of the main shaft, known as No. 5, is shaft No. 1, which is 55 feet deep, with drifts in bottom. No. 2 shaft is 150 feet further east, and is 50 feet in depth, No. 3 80 feet, and No. 4, 200 feet. To the east of No. 2, a shaft 55 feet in depth has been sunk on No. 3, with a drift connecting with No. 4. The main workings in No. 4 are 110 feet deep, and show a large vein that could all be worked at a good profit with a mill at a reasonable distance. From No. 4, the ground has been stoped, on both sides from the 60 foot level to the surface. 150 feet east of No. 4 shaft an adit is in 130 feet, in which there are two winzes, one 50 and the other 30 feet in depth on pay ore. In running the adit, the first 51 feet of work produced \$4000 worth of ore. Mr. H. C. Tate owns one-fourth, B. B. Somers one-fourth, J. E. Ramey one-fourth, and Messrs. Ramey and Stanton the balance.

The average width of the vein that is worked is 2 feet, while in most places more



BUTTE MINE NO. 5

than 12 inches of ore below \$20 in value has been left on the walls. Thirty men are steadily employed in and around the mine. At present the ore is being shipped to Koehn Springs. Mr. H. C. Tate, a practical miner, is superintendent and general manager.

THE ASHFORD MINING COMPANY

Have five claims: the King Solomon, Desert Queen, Magpie, Kootenaa and Hector, and join the Butte mine on the east. The group belongs to Thos. Bull and the Ashford Bros., who are pioneers in the camp.

On the King Solomon three shafts have been sunk—one 138 feet, one 35 feet and one 50. The 138 foot shaft and the 50 foot are connected by a drift. At the 50 foot level of the 138 foot shaft a drift has been run west 50 feet. A cross cut has been started in the 138 foot shaft, which will be put in 100 feet on the foot wall. On the Magpie, some development work has been done, also on the Kootenaa. The Hector has a tunnel 117 feet long and a 30 foot shaft. 60 tons of ore taken out in development work have been shipped to Garlock. The pay vein in the bottom of the deepest workings is two feet wide, accompanied by a large body of low-grade ore.

The King Solomon is equipped with a six-horse power Harding gasoline engine, and it is the intention of the owners to sink the

main shaft immediately as deep as the capacity of the hoist will allow.

Messrs. Bull and Ashford have other properties, three-quarters of a mile north-east of the Ashford group, on which some work has been done, particularly on the Pinmore claim, which has an adit 240 feet long, with an air shaft 70 feet deep connected. The ore averages \$10, and awaits cheap milling facilities.

Within half a mile of Johannesburg, and north of the Ashford, is located the

VAL VERDE GROUP.

Consisting of three claims—Val Verde, Val Verde No. 2 and Val Verde No. 3, or about 60 acres. It lies in the same gold belt as the Rand, Kinyon, Wedge and Butte mines. The development on the veins show $3\frac{1}{2}$ to 7 feet of pay ore, with well defined walls, which will average at the mill \$25 per ton in free gold, with about 5 per cent concentrates, which assay \$120 per ton. The main working incline is down about 77 feet, and there has been taken out in development \$7,000. There is another incline shaft, sunk on five feet of ore, which is 25 feet deep. The ore averages \$12 per ton. This shaft is located about 300 feet south of the main working shaft, lying in close proximity to the porphyry dyke, of which there is a series within the lines of these mines. There are three well defined veins within this company's property.

The east extension of the Val Verde, La Primera, belongs to the Benson Bros. They have a shaft ten feet deep and other development work.

Starting again at the Rand and going south is a group of mines belonging to Messrs. Kelly and Benson on which some work has been done. West of the Rand are the Rustler, San Diego, Agnes and Skyscraper, joining these on the west are the Sunshine and Minnehaha on which a contract has just been let for sinking and timbering a shaft. The contractors agreeing to do the work for the ore taken out in sinking the shaft.

The San Diego has several shafts and open cuts. The Rustler has an adit 65 feet long and several drifts. Some very rich ore has been taken from these claims. Messrs. Hanson, O'Leary and McGinnis are the owners.

The War Eagle joins the Olympus, one of the Rand group, on the north. The owner, Pete Hanson, has done some sinking and other work, and has four feet of ore which is said to assay \$40.00 per ton.

Joining the Skyscraper on the north, are the Eureka, Eureka No. 1 and No. 2, which have been developed enough to expose a good vein in several places. The group belongs to Messrs. Dickerson, Crawford, Hanson and Coaley. West of the Eureka with several



VAL VERDE MINE



STREET SCENE IN RANDSBURG

open cuts and two adits, is the Couley group, the Garfield, Pioneer, Gold King and St. Michael, belonging to Dr. E. S. O'Brien, J. W. Ragsdale and W. J. Langdon; north of these are the Black Sheep, None Such, Looking Back, Chosen Friends, Iron Clad and St. Julian, owned by Wolfe, Langdon and Goldsmith, and the St. Julius and Julius Caesar, the property of Wilson, Whiting and Wolfe.

H. S. Myers is developing a promising claim called the Wedge, just south of Randsburg. Next to the wedge, A. Lester is sinking a shaft which is 35 feet deep, from which ore is being taken that assays \$34.00. The Twin Brothers, next to the Lester location, belongs to Messrs. Stevens. On the north from the Twin Brothers are located the Lexington and Monkeywrench, the Lexington has been opened up with a shaft and some other work. On the 10th of last month a very rich strike was made on the Monkeywrench which is only a few hundred yards from the center of the town of Randsburg; going north from the Twin Brothers is the Yerrmaria, which has two shafts, one 60 feet and the other 24 feet; Mr. Benson is the owner. The Monte Cristo which joins this has an open cut 60 feet long, a 30 foot shaft and several drifts. Some high-grade ore has been shipped from this property. Messrs. Hanson, Stewart, Ragsdale and Langdon own the claim.

To the south, is the Julius Caesar No. 2, which belongs to Vreeland & Strong, of Los Angeles.

The Three Friends is the property of Noon and Swartz, who have done some development work. Going east, the Mojave the next claim shows a 6 foot ledge, the development consists of two shafts; the owners are Newton, Underhill and Langdon. The Sebrook joins the Mojave on the north, it has a shaft 60 feet deep and several open cuts with some small stringers in granite.

Messrs. Smith and Center have two locations north of the Monkeywrench, on which two shafts more than 100 feet deep have been sunk with several drifts and tunnels. The ore from these properties contains some manganese. Joining their claims are two of Messrs. Roberts and Mungler, who have two shafts and other development work, their ore averages about \$25.00 in gold.

The Gray Eagle, north and immediately joining Randsburg, has one of the deepest shafts in the camp, being 60 feet, the owners are Hunter and Stewart.

The New York belonging to H. H. Winchell and S. J. Montgomery, has some development work, it is in the town of Randsburg.

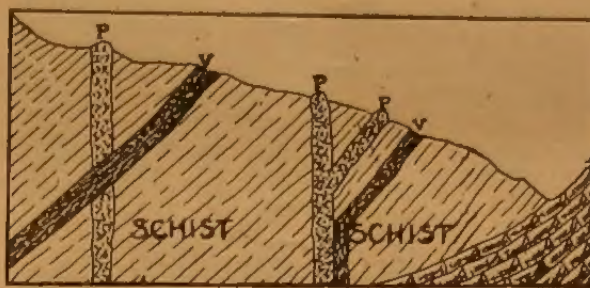
Messrs. McEwen, Keough and Linkenbach have a property south of the Rand group

which looks very well. They offer an interest for doing development work, they agreeing to do their share in proportion to interest they retain.

A section which is attracting a great deal of attention now, is the Stringer district two miles south of Randsburg. Here are found veins from three to eighteen inches in width with a value ranging from \$50.00 to \$120.00 per ton and in some instances higher. Chas. Koehn and O'Brien claim to be the original discoverers of the district, and now own valuable property there.

The Bully Boy, Lucky Boy and one-half interest in the Rose, belong to Messrs. Coultas, Jefford, Atkinson and son; they have started development on the Bully Boy with a shaft 50 feet deep and two drifts from which they have taken some very rich ore. They are said to have eighteen inches of high-grade ore in the bottom of the 50 foot shaft. Since last August they have shipped over \$4,000.00 worth of ore, and on one shipment of 6½ tons realized \$1103.00, after paying \$10.00 per ton for the hauling and milling.

The Mattie is also one of the prominent mines of the Stringer district. Mr. S. C. Wilkinson, the owner, informed us that he had a working shaft, 60 feet deep, with a 30 foot drift and several open cuts. His ore has milled from \$40 to \$125 per ton. We were shown some float from Mr. Wilkinson's location, which contained a great deal of free

SECTION OF AN ORE BODY AT RANDSBURG
P—Porphyry dykes, V—Vein, G—Granite.

gold, and we believe, with one exception, to be the richest we have encountered in California. The Hatchet, near the Mattie, has several open cuts, and has produced some high grade rock. The La Cross is another very promising location, and has shipped several hundred dollars from a very small amount of development work. Joining the La Cross are the Yucca Tree and Winnie, which were recently bonded to San Jose, Cal., people. Chas. Koehn and O'Brien are the owners.

The Napoleon, Santa Ana and Mercedes have been developed, with several shafts 50 feet deep. Messrs. Pridham, Layton and Munsen are the owners. South of these is the Merced, which is being operated; the La Grange also has some work done; next is the Wedge, which is being prospected intelligently. On the Gold Bug, the shaft is down 55 feet and exposes a 20 inch vein of ore. There is a stringer on the same claim which assays \$60. Next to the Gold Bug, Messrs. Cumming & Pierce are working, and have considerable ore ready to ship. North a short distance is the Orphan Boy and Orphan Girl, which have been opened up to some extent. Messrs. Nixon Eklund, Wilson & Kuffel are the owners. Mr. Angus Natson, who has a prospect southwest of the Winnie, is now having a shipment of his ore milled at Cutterback Lake. The Rising Star, west of the Yucca Tree, was recently sold. The Gold

Bug No. 2 joins the Santa Ana, work has been commenced. They claim to have six parallel stringers on the claim. Messrs. Doxey and Drew own the Oro Fino, La Grange, Timber Line and Christmas Gift. They have started to develop and report encouraging results. The Maguretta, Desert Star, Flying Dutchman and Lookout are all promising prospects. We have no doubt overlooked some properties that deserve mention in the stringer district, and will take pleasure in describing them if the owners will send us a description. We were particularly impressed with the advantages of the stringer district, especially for men without much capital, and the idea occurred to us that if the men we had seen in Leadville three weeks before, waiting for the strike to end, would come down to the stringer district, they could in a few months make up all the time they had lost waiting for higher wages.

We saw several small veins in the stringer district on which good miners who were willing to work could make \$5 per day. There is every indication that the veins will widen out as depth is gained.

Three miles south-east of Randsburg, Messrs. Kuffel, Wilson and Lancaster located the Black Hawk, in August, 1895. The main shaft is now 100 feet deep. They have two others, 40 and 50 feet respectively, all on different lodes. At the 60 foot level, in the 100 foot shaft, they have a drift 150 feet long; a vein 2½ feet wide is exposed in the bottom of the shaft. A large amount of ore has been taken to the mills at Garlock. The formation is porphyry and granite. There are three different lodes on the claim, one runs south-easterly, and one east and west. Ore has been shipped from all the different workings. North of the Black Hawk one half mile, Messrs. Willard and Harrison have four locations: the Rawhide, Bluejay, Bull's Eye and Ophir. The Rawhide has a 128 foot shaft, the other locations have assessment work done. 300 feet west of the Rawhide is located the Monte Cristo, on which some work has been done. Messrs. Descent & Envoldsen own the property. The Republican, southwest of the Monte Cristo, has a 60-foot shaft and some drifting. The owners are Messrs. Fifield & Nelson.

THE ST. ELMO MINE

five miles south-east of Randsburg was discovered by Si Drouillard, who found rich float. The mine is several miles from any range of mountains and is located on a perfectly flat country. Recently a power dry-washer has been used, and the ground was simply loosened up with a plow and then handled by the washer. The development work consists of eight shafts, varying in



ST. ELMO MINE



KOEHN'S MILL

depth from 20 to 100 feet. There are also several drifts. The ledge is over 2 feet in width and a great deal of shipping ore has been taken out, some of which was sent to the Selby Smelt and Lead Co. and some to the Pueblo Smelting and Refining Co. A contract has just been made with the Henry & Whipple mill at Garlock to work the output. The mine employs twelve men. There are seven quartz and four placer claims in the St. Elmo group. The owners, Messrs. D. M. Pyle, S. H. Pyle, Si Drouillard, H. L. Borgwardt and F. L. Borgwardt, are all energetic men who believe in working their properties.

The St. Elmo group is in a granite formation. Messrs. Calbrick are developing a claim northeast of the St. Elmo. They have a shaft 105 feet deep and 100 feet of other development.

Messrs. White & Hinkey own the Omega, which is also on the flat. They have a large lode of ore that has paid to mill. There are numerous prospects between St. Elmo and Randsburg, but space will not allow us to mention them in this article.

Messrs. Pyle Drouillard & Long have some locations $2\frac{1}{2}$ miles southeast of the St. Elmo. They have a lode 10 feet wide, with a pay chute from 10 to 12 inches in width. The ore is different from any other in the district, some samples having shown as high as 30 per cent in copper. They have a shaft 50 feet deep on the properties.

Southwest of the St. Elmo, a new district has been recently discovered; it is known as the Nemo district. The three Merrill bros. are the discoverers, and have sunk several shafts from 20 to 60 feet in depth, in which they have encountered good ore. Most of the ore contains copper. They obtain their water from Cutterback Lake.

Among the promising prospects around Randsburg, we failed to obtain data from, are the Security, Bercham No. 1 and No. 2, War Eagle, Cloud Burst, Old Glory, Good Enough, Bonanza fraction, Snowdrift, Marble Ashley and Green Mountain.

A visit to Randsburg is not complete without going to Garlock, located about nine miles west of Randsburg, on a level, well-traveled road. At Garlock are located the six mills that handle most of the Randsburg ore. The town has about 500 people, with well laid-out streets. It is in the Goler Mining district, and will undoubtedly receive a large share of the ore that formerly passed enroute for other places. The first mill we visited was that of E. T. Garlock, the pioneer of the camp. He has eight 750 lb. stamps, with a capacity of 15 tons in 24 hours. He recently put in a new boiler and made extensive improvements in his mill. He has had several large contracts, and recently finished a lot of 1000 tons for the Rand Mining Co. He informed us that he intended

to substitute oil for coal, to use as fuel. He has two wells—one 100 feet and one 200 feet deep.

The mill of the Visalia Mining and Milling Co. is running steadily, partly on custom work and partly on ore from their own mine, the Baron, in the El Paso district. They have two Tremaine stamp mills, and use McGlew concentrators; their capacity is 15 tons in 24 hours, which they intend to increase immediately. Oil is used for fuel. J. R. Pendergrass is superintendent and general manager.

Messrs. Henry & Whipple have a well-equipped 10-stamp mill, with 800 lbs. stamps, and a capacity of 20 tons in 24 hours. They have closed a contract with the St. Elmo mine to handle their output for some time. They also have a contract with the Wedge mine to work 500 tons of ore. They concentrate with Gilpin Co.'s bumping tables. They are now arranging to put in more concentrators; they will also add five more stamps; they do a custom business, and their work will compare favorably with any mill in Southern California.

The 5-stamp mill of Smith & Maxson was in course of construction when we visited Garlock. They have a 30-horse power Her-



ONE OF THE MILLS AT GARLOCK

cules gasoline engine, and will use McGlew concentrators; their stamps are 900 lbs., with a capacity of 10 tons per day; they obtain their supply of water from a well 35 feet deep. Realizing that a certain percentage of the values in the ores of the district were not in free gold, McKiernan & Sons put in a cyanide mill to handle the base tonnage and concentrates. They do their crushing with a 5-foot Huntington mill, which has a capacity of 30 tons in 24 hours; have amalgamating plates in front of the mill and save free gold and cyanide the balance. They use oil for fuel. The capacity of their tanks is 20 tons per day.

Thos. Kelly has a 2-stamp mill, with a daily capacity of 5 tons, in which he will do custom work; he will also use oil for fuel.

We found two assay offices in Garlock, one owned by J. H. Gyger & Bro., and the other by Carlisle & McDonald; they are both equipped for any kind of assaying or chemical work.

Some very good discoveries of mineral have recently been made around Garlock. Messrs. Beacher & Smith are opening up a claim two miles north-west of Garlock; they have brought some good ore in from their claims. Messrs. Gyger own the extension.

Messrs. Munson Bros. & Wilson also have locations in the same neighborhood. From the Heald mine, in the same vicinity, 5 tons of float rock returned \$175.

Five miles northwest of Garlock, at the head of Goler canon, Messrs. Gyger, Showers & Slusser have discovered a large lode of copper, which is said to be 32 feet wide. They have sunk 15 feet, and an average sample from six feet showed 14 per cent copper and 5 ounces silver.

One of the most important discoveries for Garlock, and its main industry of milling, is the coal vein that was located recently by Mr. T. H. Heald, five miles northwest of Garlock. Mr. Heald formerly owned the coal mines near Elsinore, in Riverside county, and knows what coal is. He claims the coal he has discovered has been used in the blacksmith's forge and burns well. The vein is 2 feet wide, 8 inches of which is hard coal. The property now belongs to Heald, Bracewell & Mullen. The future of Garlock as a milling point, not only for Randsburg but as far west as Panamint, is assured—if this coal proves to be in sufficient quantities. The town of Goler is only a few miles from Garlock, and trade from there will naturally come to Garlock.

We found in the Desert Mercantile company's establishment at Garlock everything needed by the miners and were informed that the prices were the same as at railroad points, plus the wagon freight to Garlock.

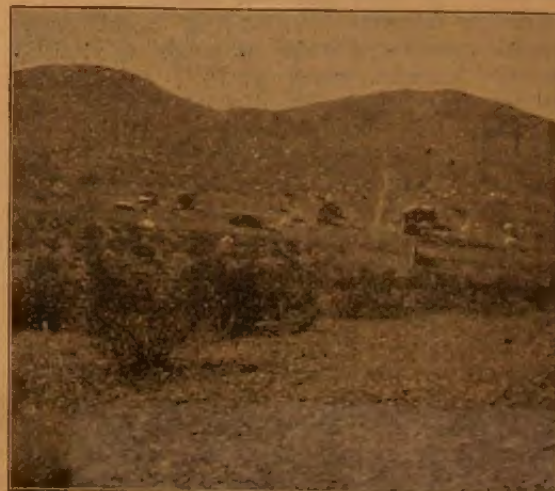
At Mesquite Springs, 2 miles northwest of Garlock, Mr. Bland is operating a 2-stamp mill on ores mainly from around Mesquite.

At Koehn, 10 miles from Garlock, Mr. Chas. Koehn, one of the pioneers of the country, is running a 10-stamp mill on custom work. So thorough has Mr. Koehn's work been that he has been able to keep his mill running, although somewhat handicapped by being further from the mines than some of the other mills.

The new mill of Willard & Harrison, at Cutterback Lake, six miles from Randsburg, completes the list of mills.

The average price for hauling ore from Randsburg to any of the mills is about \$2.50 per ton, with a \$5.50 charge per ton for milling. There should be no complaint from the miners concerning their treatment by the mills, as their prices compare favorably with some of the older camps where fuel is much cheaper.

One mile from Randsburg, the town of Johannesburg has been laid out; the streets are wide and the location is well chosen. There is a large hotel that will accommodate a number of guests. A bank building is in course of construction, also many other substantial buildings. The tract was recently taken by Easton, Eldridge & Co., who will



JOHANNESBURG—40 DAYS OLD

CORRESPONDENCE

ARIZONA.

ORO BLANCO, ARIZ., March 4, 1897.

ED. JOURNAL:—Matters in this camp remain quiet, although favorable progress is being made.

The Old Glory mill has made a very satisfactory run, and is to put in a cyanide plant for tailings in time for the summer rains.

The Tres Amigos mill is running steadily with good results. The ore holds up to usual grade, and some very rich streaks have just been discovered.

The Franco-American company has started work. This company owns three patented mines, and the prospect for rich developments seem good.

The Oro company have just struck a rich ore body, which is said to average over \$100 gold per ton. The mill is running steadily. I understand they are to put up works for running their concentrates.

Yours Truly,
C. W. KEMPTON.

CALIFORNIA.

Virginia Dale Mining District.

Wednesday, Mar. 10, 1897.

EDITOR JOURNAL:—The annual election of the Virginia Dale Mining district was held at Killian's mill on Monday, March 8th. The miners of the district seemed to take considerable interest in the election of recorder. The respective candidates were Messrs. Hart and Killian. Killian, who is the present recorder, was re-elected by a majority of thirty-eight votes.

The district is improving fast and real estate seems to be on the boom, as a number of men gathered at Lyon's Well, the most assessable townsite, and located about fifty-five acres of land in the way of mill sites and town lots, some are ordering lumber to build business houses. The Virginia Dale Mining and Milling Co. are erecting a mill of 75-ton capacity and intend to do custom work, which will enable miners who have not machinery to have their rock milled. There is considerable development work done on the various mines of the district.

Messrs. Haleworth & Bedford have started a 500-foot tunnel on the Star mine.

The owners of the Leoti mine have started a tunnel that will tap the lode 250 feet below the surface. They struck the ledge a few feet from where they started the tunnel, which shows a lode 4 feet in width.

Dinwiddie & Drew are in 150 feet with their tunnel, near the Virginia Dale mine. Have struck a small lead of ore which assays \$750 per ton.

Baird & Lingo are doing considerable development work on their mines, which are located three miles and a half south-east of the Virginia Dale mine. They are down on the Lookout 35 feet which shows a well defined ledge, assayed from \$16 to \$119 per ton. And have started a force of men this morning to work on the Ranger, another prominent claim belonging to the company. They will also put a force of men tomorrow on The Ladies mine, which is an extension of the Lookout.

Messrs. Reed & Wagner, of the Gold Basin group, are taking out five tons of ore for a mill test. Reed & A. M. Ham have begun work on the Gold Bug, which is an extension

of the Sweden No. 2 in the Gold Basin group. The ledge is about 2 feet in width and of good quality.

Col. Sweesy will begin tomorrow to sink a 50-foot shaft on the Noble Grand mine, which is located about five miles south of the Leoti.

Messrs. Wright & Stewart, who have lately come into the district, have located two claims, the Lulu and Mountain Sheep, which promise to become prominent claims in the future.

I. R.

COLORADO.

BOULDER, COL., March 3, '97.

The year 1897 has opened very auspiciously for the mining industry of Boulder county. New plants of machinery for treating the low grade ores are being built at the mouth of Boulder canon, one of 50 tons daily capacity, the second 25 tons, while the third projected will have a capacity of 100 tons daily. Then, new mills will treat the telluride ores of our county by the chlorination and lixivitation process, which the owners claim will save 95 per cent of the precious metals contained in the mineralized matter at a nominal expense.

A short time ago, a phenomenally rich strike was made in the Emancipation mine, owned by an English syndicate, while extending the 160 foot level east. The ore was marvelously rich in gold, the first class yielding \$35,000 per ton, and the second grade running correspondingly rich in the precious metals.

The vein of solid mineral was from 4 to 6 inches thick in the back stope near the face of the drift, and from an examination would appear to be opening in size as the stope is carried forth. Specimens of the mineral (sylvanite) which were brought to the city, and placed in the company's office by the superintendent, Prof. Bert Langridge, was a wonderful piece of ore, and the admiration of all who examined it. One assayer offered him \$60 for the ore, not as a specimen but for its intrinsic value in gold and silver.

This is the mine that was in litigation for about ten years, and cost the contending parties over \$50,000, when the property passed into the hands of the several attorneys on the fee system. Parties are apt to fight over such mines for supremacy, and invariably come out at "the little end of the bottle." The Emancipation was sold in London, England, and since the water has been removed and the mine put in shape for operation, it has not ceased to pay a dividend to the owner.

Development work is being carried on extensively, and the levels and shafts are full of beautiful mineral, and teams are constantly hauling ore to the Chamberlain Sampling Works, when it is sampled, assayed and then shipped to the Denver smelters.

Yesterday, a small retort of 27 ounces gold was brought to this city by the Sherman brothers, leasers of a portion of ground in the Golden Age mine, Jamestown. This retort was the result of a few pounds of first class stuff, which the boys pulverized and panned out by the aid of quicksilver, to catch the fine gold contained in the mineral, while the concentrates from such rich ore yield from \$2 to \$3 per pound, while the second class runs about 40 ounces gold to the ton. The boys are making great wages, while fifty miners find employment in the mine and all are leasing.

REGULAR.

MEXICO.

ZACATECAS, MEX., March 4, 1897.

EDITOR JOURNAL:—Mexico continues to

prosper and the investigations now being made clearly prove that there is not a more inviting field in the world for the capitalist in search of mines.

Clarence King and party are making an examination of the San Cristobal gold mines, and from reports are quite likely to take them for a French company. These mines are well developed and will give quite an impetus to gold mining in this district if the sale goes through.

The San Luis del Oro recently struck quite a body of very high grade gold ore, and have made some sales of ore as high as 7 kilos per 1000 kilos. This is owned by a Mexican company, and the report is that they have let the contract for a mill. There are some fair gold prospects in this district and I believe only lack development to create considerable of an excitement. Quite a number of mining operators have looked over the gold district and all seemed pleased with the outlook.

They have just had a fire in the Amador shaft of the Sombrerete Mining Co's. mines at Sombrerete, causing a great loss of life. At the present time they do not know the origin, but suppose it was caused by carelessness in leaving a lighted torch hanging on the timbers. As nearly as can be ascertained 105 persons are missing, although up to the 3rd ult. only 101 bodies have been recovered. The fire occurred on the 25th ult., but by reason of the heavy fumes they have not yet been able to get into all portions of the mine to ascertain the exact condition.

The low price of silver in the United States does not interfere with the operations of silver mines in Mexico, and is a benefit to this country as it keeps the money at home where it is worth as much as it ever was.

PLATA Y ORO.

SANTA DOMINGO, SONORA, MEXICO,
March 7, 1897.

EDITOR JOURNAL:—The northwestern corner of Sonora, from Altar to Port Isabel, is a country very little known to prospectors or mining men generally. The reason of this is, not because it lacks mineral, but on account of the absurd restrictions placed on the practical prospector by the Mexican mining laws, which act as a hindrance both to the native and foreigner.

Nobody can get a title to work a mine without first getting a "concession," which is simple enough, and then getting it surveyed, which is quite expensive, and, if a foreigner, he must get a permit from the general government to hold title to mines within the "zona libre" (the lands lying within 60 miles of the frontier).

That there are good mines in this part of the country goes without saying, as it lies in the heart of the best mineral-bearing belt of the world. Your correspondent came across old silver mines, which evidently were worked long ago, as there were shafts hundreds of feet deep, and all the signs of old dumps, ruined houses, etc., indicating large works; but all are abandoned and forgotten, and probably will remain so until the white metal resumes its place in the monetary systems of civilization. However, the mineral wealth of the country is not altogether dependent on silver.

Gold has been found in placers which have been worked all over the country, more especially at Cazon, Quitabac and Vera Cruz. I have also seen very extensive old workings near the frontier at Sonoita. But the returns are very poor, as all the work is done by Indians with dry washers—water being ex-

ceedingly scarce all over the northwest frontier.

I have seen some very fine gold properties which are being opened up. The Dolores and Bonanza mines (of C. B. Serventi of Senoita) are extremely rich, strong veins. These mines are in the Sierra Pinta mountains, about 10 or 12 miles west of George's Bay, on the Gulf of California, and have been worked on a small scale for years by Mexicans. But, as they had to haul the ore 25 miles on burros, and then arastra the rock, (also with burro power) it was quite expensive; yet, as the rock often goes up in hundreds of dollars per ton, they made it pay. These mines are bonded to Los Angeles capitalists, who, I understand, intend to work them in proper shape as soon as the necessary papers are made out as to title, etc.

Another very large proposition is the San Francisco group of mines, the property of Mr. M. G. Levy, of Santa Domingo. Mr. Levy has spent \$60,000 developing this group, and he has opened them up in very good shape, and will, doubtless, get good returns for his outlay, as the mines are strong, permanent ledges, and carry pay ore from top to bottom, of a value of \$18 per ton.

Your correspondent was treated very kindly by all he met, and returns thanks more especially to C. B. Serventi, Esq., of Senoita, and Don Cipriano Ortega, of Santa Domingo, who did all in their power to make his stay in their country pleasant. E. H.

NEW MEXICO.

ORGAN, N. M., Mch. 7, 1897.

EDITOR JOURNAL:—Mining is not very active in the Organ mountains at present, due to a lack of capital for development. I have been doing some prospecting south of San Augustine in what is known as Texas canyon and have located a lode which is from 10 to 40 feet in width, and have had assays from a trace to \$62 in gold. Messrs. Dodd & Rigley have several claims in the same district and are working them. The average width of the pay chutes is 6 inches to 2 feet, with plenty of wood and water near.

It is expected that work will be resumed at an early date around Black mountains.

At the Jicarilla mountains De Mud & Beard have been negotiating for a sale of their property on a basis of \$30,000, but unfortunately litigation has prevented any transfer.

W. H. Skidmore is still working the Bennett mine.

We are suffering here, the same as in other good mining districts, on account of the low price of lead and silver, and if these metals are ever put back to the old price the Organ Mining district will once more teem with life and prosperity. JOHN P. FOY.

NEVADA.

[Traveling Correspondent.]

IONE, NEVADA, March 5, 1897.

EDITOR JOURNAL:—The Bray Bros., formerly of Austin, are running a 10-stamp gold mill here with good success, and hauling their ore eight miles in wagons.

This is a good prospecting section for people of limited means.

Resolutions were adopted by the employees of the De La Mar Mining Company, at a meeting held in De La Mar a few days ago, setting forth that the men had no intention of injuring their employers, and that they were satisfied with their wages and the treatment they had always received from the manager.

There will probably be no trouble, and the mines will be started up again after some repairs have been made on the mill.

A report has been circulated that coal has been found near White Horse district, in Washoe county. The body is said to be five feet thick.

Snow is still deep at Gold Creek, Elko county, and prospectors will do well to postpone any contemplated trip to that district for three weeks longer. Many conflicting reports are being sent out about the discoveries there. The Gold Creek Nevada Mining Company own nearly 8000 acres of land, which is said to carry an average of 75 cents per cubic yard.

Prospecting in Southern Nevada is going on at an extensive rate, and before the summer is over every corner of Nevada will be well examined.

Miscellaneous Mining News.

ARIZONA.

Operations on the eighth level of the Old Dominion mine at Globe have been seriously hampered by the occurrence of water in a soft, loose body of iron ore that causes caving and the breaking of timbers, the material coming down in these breakdowns being of the consistency of quicksand and soft mud.

Thirty-five men are working at Placeritas now. Water is plenty. Tom Howell is supplying the camp with hay. Geo. Neat supplies the camp with fresh beef.

It is reported that an English company recently purchased thirty mining claims in Indian Secret district, Mohave county, for \$2,000,000.

The new company well at Pearce has reached a depth of 175 feet. Solid formation has been encountered and the work of sinking now progresses more slowly. No signs of water are apparent.

It is reported that By Collins has struck a rich body of gold and silver ore on his Blackfoot mine at Todd Basin. The Blackfoot has been a steady producer for several years, but the present strike eclipses anything found in that section.

Two quartz mills are now en route from Chicago, to be placed on properties of the Chicago Gold Mining company in Big Bug district.

The Elkhart mine is putting in a big concentrating plant at Chloride. The Development Company is putting the mine in good shape, and have enough ore blocked out to keep the concentrator in constant operation. The product will be shipped to Colorado.

One of the most important enterprises that has occurred in Arizona for several years is the building of the smelter at Crittenden, which will be in charge of W. H. Nutting, formerly superintendent and metallurgist of the Bi-Metallic smelter at Leadville, which closed down last October on account of the strike. The smelter will handle all classes of ore and starts under the most favorable auspices.

CALIFORNIA.

BUTTE COUNTY.

T. L. Vinton is working a crew of forty men on a portion of the old Spring Valley claim, Butte county, under a permit from the United States Debris commission. The ground is very hard, requiring extensive blasting, 2500 pounds of powder being used in each blast in the tunnels made for the purpose.

KERN COUNTY.

A mill run has just been finished on ore from the Marvel mine, three miles south-east of Randsburg, the ore averaged \$121.80. The owners are Messrs. Faust & Matthewson. They have one shaft 45 feet deep and another 36 feet deep and are working five men. They have refused a good offer for the property. The owners were in debt when the lode was found, all of which they have paid off and have a balance in the bank. They had 3 inches at the surface, which has widened out to 14 inches at 45 feet in depth.

Colonel C. F. Crocker, of the Southern Pacific Co., states that they have made surveys and have everything in readiness to begin building a road from Mojave to Randsburg, California, but are awaiting until satisfied that the developments of the camp will warrant this. A road could be built in a few weeks.

NEVADA COUNTY.

The work of putting in the new crown wheel to the North Star pump was finished last week, and the pump is once more at work after a stoppage of about four weeks. Although many miners and tributaries have been forced to cease work by the flooding of the mine, the water has not crept up as fast as was expected. It is now slightly above the 1800-foot level. It was thought the 1200-level would be submerged. — Tidings.

RIVERSIDE COUNTY.

During the month of February there were seventy-seven mining locations filed in Riverside county.

James Manning was killed by a premature blast in the Good Hope mine, Tuesday. For many years he was interested in mining in Idaho and came to Perris about six weeks ago.

The mining camp of the Oro Vista company in the Tanquitz district is gaining considerable prominence in having some well-to-do Santa Fe men connected with it. Joe Thomas will conduct a stage regularly from the camp to Hemet, which has been made the point of supply. As soon as the snow goes away around the mines work will begin with vigor.

SAN BERNARDINO COUNTY.

Work is still progressing on the Columbia mine, in Macedonia district. One shaft is down 75 feet, and another 30 feet is being sunk, also a cross cut tunnel 140 feet long. This tunnel taps the ledge about 100 feet deep. 200 tons of second class ore is on the dump that will average \$55, and ten tons of first class that is expected to assay \$200. There is over \$50,000 worth of ore in sight in the mine.

The Occidental, Golden West and Good Hope are all showing large bodies of ore.

The Oro Fino Mining and Milling Company has filed articles of incorporation. The capital stock is \$1,000,000; directors, C. L. Ingle, B. Wood, H. P. Wood, H. L. Titus, and M. H. Titus.

H. U. Mudge is developing a group of 5 claims in the 29 Palms district. A ten-stamp mill will probably be put in this spring.

All the mills in Banner are running and the camp was never in a better condition.

The Golden Cross mine at Hedges is turning out over \$1,000 per day.

The Golden Dream Company at Picacho are pushing work on the Noonday mine.

COLORADO.

The Last Dollar, Cripple Creek, shipped last month thirty-six cars of ore to the cyanide mill at Florence and fourteen to the Pueblo smelters. The first ran from \$18 to \$20, and the second from five to seven ounces.

The Dead Pine, on Battle mountain, Cripple Creek, is being worked under lease and bond by Dennis Sullivan and others of Denver. This shaft has been sunk 500 feet and about two cars of ore each week is hoisted from the 400 and 500-foot level.

Machinery has arrived for the Anderson mill, at the mouth of the Virginia canyon, Idaho Springs, and it is expected that the plant will be running in a couple of weeks. The Kinkaid process will be used and the capacity will be 20 tons per day. The starting of both this and the Jackson mill is looked forward to with satisfaction, as ore shipments are steadily increasing and there is work for them to do.

The following mines, located on the blanket veins of Yuba Dam Flats, Breckenridge, are all being worked under lease or lease and bond: The Stonewall Jackson, Stephenson, Mollie B., Sultana, Fox Lake and Shakespeare groups. They produce smelting ores largely of a sulphide character, though galena and carbonate ores are not infrequent. The majority of the development has been by tunnels.

Nearly 600 tons of Cripple Creek ores are treated every day by mills alone. Of this the Brodie handles 75 tons, the Bi-Metallic Extraction company at Florence, 250 tons; the El Paso Reduction works at Gillett, 50 tons; the Pittsburg-Colorado Reduction works at Colorado City, 200 tons; the Hartzell mill, 20 tons.

Development work on the Nellie mine, Bear creek, near Telluride, is being prosecuted vigorously and better progress is being made drifting on the Nellie vein for the Star Gazer, owned by Coslett & Stansbeck, the objective point of the drift, than was expected. It is going ahead five and a half feet a day, with two shifts, and at the present speed the Star Gazer will have been cut inside of three months.

LOWER CALIFORNIA.

Mining on the Gulf Side.

Messrs. Salvador and Manuel Salorio, who have recently returned from the gulf side of the Peninsula, state that mining is very active in that section. The San Juan mines, just below the 28th parallel, on which work was temporarily suspended for a time, are now operated by Messrs. Schramm and Moraga to their full capacity. About 150 men are employed at the mine and nearly the same number in the reduction works, which are about seven miles distant from the mine and connected by a railroad. The San Juan mines have been operated for the past twelve years, the main shaft is down 1,000 feet, with extensive drifts and cross-cuts. The ore carries both gold and silver, of the latter the average is 40 ozs. per ton, of the former \$8 to \$10. These mines were formerly owned by the Cranz Brothers of San Jose, Cal., who developed the property to its present importance. At San Franciquito the Lacy Brothers of Los Angeles are pushing development work on what is known as the Barena mines which they recently purchased. They have a large force of men at work, have sunk the shaft to a depth of ninety-five feet and have tunneled a hundred feet or more. Their machinery, including a Huntington mill of 20 tons daily capacity, dynamo for electric lighting, etc., is now on the ground and is being rapidly got in position.

With the schooner Anita, which arrived from Santo Domingo last Mar. 5, came the cheerful news that the Ibarra mining company at Calmalli are opening some extensive bodies of ore, much of which is very high grade, and that work will probably soon be resumed on a larger scale than ever.

It is reported that miners are again in demand in the Alamo. Several of the mines in that district are increasing their forces, and a number of men have left Ensenada during the past week to find work there.

Mr. F. M. Bradshaw of the Aurora mine writes that they are hoisting some nice looking rock and are now working twenty men. He states that indications are most promising.—*Lower Californian*.

MEXICO

Mr. Cameron, representing the Pelton Wheel Company of San Francisco, and Mr. Gardner, the company's electrical engineer foreman, left Chihuahua last week, for Jesus Maria, to investigate the feasibility of utilizing the falls in the vicinity of that place for supplying power to the numbers of stamp mills in that neighborhood. Should the project materialize, mining will be greatly helped there, as under existing circumstances, the cost of running the mills is said to be too expensive on account of the price and scarcity of wood.

On March 7th, the new pumping engine at the Maravillas mine, Pachuca was formally inaugurated.

A Mexican discovered a quicksilver deposit near San Luis Potosi, about two months ago, and has since that time shipped three carloads of quicksilver from the mine. The discovery is one of the remarkable incidents in the recent mining development of the republic.

"La Compania Limitada de Terrenos Auriferos en Mexico" of London, with a capital of £300,000, has purchased twenty-five square miles of mountainous land in the Arizpe district of Sonora, which is said to abound in gold and silver.

NEVADA.

The Bailey process is to be used in extracting the precious metals from the tailings and low-grade ores of the Holmes Mining Company at Candelaria and Belleville, in Esmeralda county.

Gold Creek, New mining camp, is to have a daily stage from Elko, and the fare will be \$5. Two other lines are to be started, or have been, in operation.

The DeLamar Company shipped \$28,000 in bullion in January. Owing to trouble with the miners, work has been temporarily discontinued.

It is reported that 50 additional men are to be put to work in the Adelaide copper mine, near Golconda, in a few days.

Mrs. M. A. Graham, of Salt Lake City, Utah, and Mrs. Thos. Carter, of Mercur, Utah, own some mining properties on the west slope of the Cumberland Mountains, near Osceola, on which they are working. They have ore which averages \$20 in gold per ton.

NEW MEXICO.

The American mine made a test run on some ore last week, running between four and five tons, and

the reporter was informed that this small amount of ore yielded \$1,225. This ore was taken from an 8-inch vein that has just been uncovered on the 100-foot level. It is further stated that two miners picked out two pounds in gold nuggets from the same vein. Other ore of a lower grade has also been encountered.

It is reported that the placer miners have made a new discovery of pay gravel near San Pedro and are doing well, extracting the gold with small dry washers.

The miners of the Black Copper district held a meeting last week to perfect the district organization. Every thing passed off smoothly. The Black Copper district is now separate and distinct from the lower Red River district.

After a very successful run, it is learned that the Chloride smelter has closed down for a few slight repairs.

The Fitzgerald mill at Golden was sold by the sheriff to satisfy an execution held by H. G. Coors, of Las Vegas, for \$479. The property was bid in by Mr. Coors, who immediately re-sold it to Bryden & Rogers, who have been operating it under a lease for some time. The mill is now working under contract on ore from the Carley & Arande strike.

The North Homestake mine, at White Oaks, has begun operation with a small force of men.

The leasers on the U. S. mine at Kingston have another carload of ore ready for shipment.

UTAH.

The Ontario mill made a shipment last week of 42 bars containing 22,296.92 ounces fine silver.

The Silver King distributed the monthly checks among their employees at Park City, March 10. The regular monthly dividend of \$37,000 was also paid.

Frank Andrew, one of the parties interested in the sensational Thompson strike, near Terrace, left March 10th for the scene of operations. It is his first visit there, and he will remain long enough to make a thorough examination of the find. Another lot of specimens received yesterday are on exhibition at Andrews furniture store.—*S. L. Herald*.

A strike of ore was made last week in the Alaska shaft at Tintic at a depth of 133 feet. The veins said to be nearly four feet wide and looks first-class.

The famous Dragon Iron mine, which has been shut down for some time past, resumed work Thursday morning with the usual force of men. This property is one of the bonanzas of Tintic and contains an inexhaustible body of high grade iron, some running as high as 70 and 80 per cent. iron. The mine is in such a shape that hundreds of tons of ore can be taken out at a nominal cost. This property has been a steady shipper since 1882, having produced on an average of 1000 tons of ore every month since that time.

Captain De Lamar has surrendered the option held on the Mercur mine in Utah and forfeited the \$25,000 deposited for the same. He claims the owners refused to make certain concessions asked for.

The mining districts of Piute county will come in for their full share of recognition this year and it is believed that before another season this region can boast of a score or more of prolific producers.

GENERAL NEWS.

Probably no business has progressed more in the way of mechanical improvement in the last twenty years than the manufacturing of mining machinery. Twenty years ago the miner knew little or nothing about processes which today are considered indispensable to the economical working of low grade ores. Among the firms who have kept pace with the development of the mining industry, none are better known than W. H. Birch & Co. of San Francisco, who have one of the best equipped shops in the west for turning out anything needed by the miners. They have just completed a fine plant at Garlock, Cal., for Messrs. Smith & Moxon. Their trade extends to all parts of the west and Mexico, and their machinery always makes a reputation for itself, as they make a specialty of allowing nothing to leave their foundries until it has been personally inspected and found in perfect order.

The mining man, accustomed to shipping ores and sulphurets to smelting and metal-

lurgical works for treatment, is well acquainted with the differences that frequently occur in weights and assays between mine and smelter returns. Many companies, shipping regularly and in considerable quantity, are represented at the smelter when their ores are sampled, a practice permitted at all works, and by personal supervision during the sampling and a subsequent assay of a portion of the final sample, reducing the possibility of error.

Mr. Abbot A. Hanks, 718 Montgomery st., San Francisco, is making a specialty of representing absent owners at the sampling of ores in San Francisco and at the smelter at Vallejo Junction. Mr. Hanks is present during the sampling, checks the weights and moisture, and takes a portion of the final floor sample for assay. He is particularly well fitted to perform this work, being by profession a chemist and assayer, and having his own laboratory in which his floor samples are assayed. By giving personal attention to each branch of the work, he assures correct returns.

In this age of economy the discovery of anything to save money is the aim of all, whether it be in the manufacture of matches or the building of houses. One of the greatest economizers that has been produced, at least for steam users, in recent years is the Anti-Caloric Plaster and Steam Pipe Covering. One of the first difficulties encountered by a miner is scarcity of water, and when he finally develops sufficient for his mill his next aim is to save it and use it over again. There are many ways of saving water but the best way is to cover the boiler and steam pipes with a covering that will keep the heat in the pipes and boiler, in this way the amount of water consumed for steam purposes is reduced. The value of the Anti-Caloric plaster and steam pipe covering for mills and steam pipes conducting steam to pumps in the lower levels of mines is almost incalculable. In many instances hundreds of feet of steam pipe are found without any covering and the loss of efficiency is very great especially running down a shaft where the current of air is strong and keeps the outside of the pipe chilled. The Anti-Caloric covering is manufactured in San Francisco at 401 California street, from the products of California soil, it is especially adapted for mining purposes on account of the convenient shape for handling. There is no plaster of paris in the preparation, the 5 per cent of asbestos that is used is simply to strengthen the preparation. The plaster is recommended for boilers and engines, also pipes that are over three inches in diameter. This plaster can be removed at any time and re-applied by softening with water without losing any of its steam saving properties. Recently a test was made of plastering a house with the preparation and then submitting it to a hot fire for over half an hour. The house was finally turned over and rolled about without injuring the plastering in any way or burning the lath under the plaster. Insurance men expressed themselves as being surprised at the results. The covering has been adopted by many of the large mining companies on the Pacific coast, among others the North Star and Pacific Coast Borax Co. The Union Iron Works of San Francisco use it extensively, also the Southern Pacific railroad. On steamboats it is also becoming very popular, the Pacific Mail Steamship company and others are using it on all their boats. The company will furnish any information desired about their products, also samples and price lists on application.



TUTTHILL IMPROVED IMPULSE WHEEL.

AN IMPROVED IMPULSE WHEEL.

This has been called "the age of steam." Would it be more exact to say the age of power? The former expression has probably arisen from the fact that nearly two-thirds of the applied power of today is derived from steam, while but one-third is derived from water.

Our present enormous and constantly increasing coal consumption must, however, in the distant future exhaust the most accessible of nature's stores, and be followed by increased cost of production and rising prices, which will render economical the development of water power and its substitution in many instances for steam previously employed.

Recent rapid strides in the successful and economical long distance transmission of electric power has and will be the most potent agency in rendering servicable many natural water powers easily and cheaply developed, which have heretofore been too remote from any market to attract the attention of the manufacturer and the engineer.

These two agencies will undoubtedly hasten the rapid development and utilization of a considerable part of the 200,000,000 H. P., which it has been estimated the streams of this country alone are capable of affording.

It must therefore seem that any substantial advancement in the perfection of the mechanical appliances whereby the power of falling water can in its greatest entirety be transformed into useful work, must be of more than usual interest to the general public as well as to engineers and others directly interested in the utilization of power.

The two general types of water wheels which have outstripped all competition in the gradual development of mechanical perfection and high theoretical efficiency, are the turbine wheel and the jet propulsion wheel. Without entering into any general discussion of the relative merits of these two types, it may be said that each has its special field of adaption, and that when these are properly understood the line between the two is too well defined to leave any considerable field for conflict. Of both there are, of course, many varieties, differing in details of design and having various degrees of efficiency in use, but it is desired in this instance to direct the attention of the reader to some particular details of the jet propulsion wheel, designed by Mr. S. J. Tutthill of San Francisco and

manufactured by the Oakland Iron Works at Oakland, California.

The wheel differs from other well known jet propulsion wheels, principally in the care with which its designer has embodied the results of the most recent scientific research in the arrangement of all important details; and thus by a full appreciation of the true supplemental relation between sound theory and good practice, has produced an unusually high type of wheel.

In order to fully appreciate the accomplished results it may be well to here briefly outline the special theoretical requirements which must govern the correct design of all impulse wheels. On just how nearly these requirements are fulfilled will depend the ratio between the useful work given off by the wheel and the power applied to its perimeter in the issuing jet. The more nearly this ratio approaches unity, the more perfect and the more economical the wheel. The energy of the issuing jet of water in striking the buckets of the wheel, if they be of the backward discharge type, is transformed into useful work by imparting motion to the wheel in two ways: first, by the direct impulse of the jet; and second, by the tangential reaction of the water as it is deflected by the curve of the bucket back more or less nearly parallel with the direction of the issuing stream. The theoretical perfect wheel would require that the impelling jet strike exactly tangentially with the wheel's perimeter; that the stream without change in the form of its cross-section be deflected 180 degrees in the bucket, and that it then fall vertically from the wheel with all its power of motion spent; and that in the accomplishment of this there be no spraying, foaming or friction, since all such disturbances represent loss of energy in useless heat instead of work. The wheel that gives off the same degree of energy that it receives will, of course, never be built. Friction in bearings and between water and buckets can never be wholly eliminated; breaking up of the molecular lines of discharge and incidental foaming must always occur to some extent on striking the buckets. The condition for most economical working, when the peripheral velocity of the wheel is equal to one-half the mean velocity of the impelling jet, is not often maintained, and is consequently the reversal in the direction of the impinging jet cannot be entirely complete

without producing some backwash on the buckets.

These and other conditions prevent the attainment of the ideal, but do not prevent under intelligent design the realization of a high degree of efficiency. In the Tutthill wheel these incidental losses have been kept very low in the following manner:

1. The impelling stream is not divided on striking the bucket, but entering tangentially to the curve of the bucket, is entirely deflected in one direction, alternately to the right and left with each succeeding bucket; thus reducing to a minimum all tearing or separating of the stream and incidental wasteful production of heat instead of work, while the alternating of the bucket discharge between right and left gives large clearance for the falling of the more or less completely spent water, and permits the nearest approach to a complete reversal of the direction of the stream with backwash. Any gain in clearance thus affected, of course admits of greater capacity for receiving water, and consequent greater output of power for a wheel of given diameter and speed.

2. The shape of the discharge lip of the bucket is a radical departure from other makes, and is a recognition of the requirements of theory in accomplishing the reversal of the stream and absorption of its energy without serious loss incident to the impact resulting from the distorting of its section. The usual flattening of the stream's section and the discharging of it in a thin sheet along a lip of considerable length is in buckets of such a type, a cause of very considerable loss of energy.

3. In addition to the above points, the designer has given special attention to the form of the nozzle employed, and has adopted a form simple in design and directly in accord with the requirements for high efficiency as determined by scientific hydraulic investigators. It is evident that the successful embodiment in practice of the true theory for the correct design of impulse wheels, as accomplished in this particular wheel, must result in an unusually high degree of efficiency; and while no precise tests have been as yet completed for determining the exact degree of efficiency obtained, the results of approximate tests, made on some of the considerable number of wheels already in use, clearly indicates this to be another illustration of the truth of what should be an axiom among engineers, i. e., the best practice is always the most perfect embodiment of sound theory.

Luckhardt's Combined Assay Office and School of Instruction, incorporated, whose card appears in another column, begins business under the most favorable auspices, having convenient and well equipped assaying rooms, a strong corps of teachers and a reputation for absolutely correct work already done. They give courses, which will enable a man to do all ordinary work for prospecting or similar purposes, to a full course which gives a complete knowledge of the determination and the economical treatment of ores, metals, mill tests etc., making a man a practical and competent assayer, either to take charge of a mine, assay office or open one on his own account. The school is under the direct supervision of Mr. F. R. Luckhardt, son of the late C. A. Luckhardt, formerly proprietor of the Nevada Metallurgical Works, who was so well known as a practical and successful metallurgist, and had been brought up from infancy to his work. He formerly taught under his father as well as elsewhere, did check work for the U. S. Mint, the Selby Smelting Company, Daniel

Meyer and others and was head assayer and manager for his father. During the exhibition in 1885 at the Mechanics' Fair, Mr. Luckhardt constructed dynamos and machines for the Pacific Coast Electrical Construction Company, the company then being awarded a grand silver medal. Luckhardt then was serving his apprenticeship in order to gain knowledge for the electrical decomposition of metals from ores. He is Vice-President and assayer of this corporation. The Secretary A. E. Hawson, is also a skilled and practical man, the other parties interested being likewise practical mining and business men.

In the line of general assaying, etc., this office will be found equal to any in San Francisco and ores, etc., submitted to them for determination or any business of the kind will be promptly and satisfactorily attended to at reasonable rates.

PERSONAL-NEWS ITEMS

Ed Holland of Indio, Cal., of the firm of Tingman & Holland, was a caller at the JOURNAL office March 11th and reports considerable activity in the desert.

Wm. Owens, of Nevada, who has been looking over the mines of Randsburg, returned to his home in Dayton, Nevada, last week.

Messrs. Hall, Roberts and Reno, representing a Texas syndicate, are in Sonora, Toulumne county, Cal., looking up properties for their company.

Thos. Ryan, of the Lost Horse Mining and Milling Co., whose properties are about sixty-eight miles east of Banning, Cal., called at the JOURNAL office the 12th inst., and has since left for the desert.

H. R. Ayres, Fraser & Chalmers' Colorado agent, gave the JOURNAL office a call last week while on his way to San Francisco, Cal.

P. H. McLaughlin, of the Connor mine in Mohave Co., Arizona, is spending a few weeks in California.

Messrs. W. A. Davis and H. F. Hartzell, of this city, went down to their mine, the Vignaga, at Alamo, Lower California, Mexico, the fore part of the present month.

W. M. Darling, of Oakland, Cal., interested in the Slate Range, Cal., came down to Los Angeles last week and made the JOURNAL a call.

E. B. Gage, of the Congress mine, Arizona, spent some days in Phoenix, Arizona, last week.

Sr Enrique C. Creel, of Chihuahua, Mexico, recently made a trip to the City of Mexico on important mining business.

L. P. Santy, an old time New Mexican, was in Las Vegas, N. M., from Clemens, Kansas, recently.

T. P. Carson, a prominent mine operator of Prescott, Arizona, left Prescott March 7th to examine mining property in Coahuila, Mexico.

Supt. W. W. Hill, of the Black Warrior Copper Co., Arizona, spent several days in Globe, Arizona, last week.

Messrs. Chas. D. Lane, part owner of the Utica mine at Angels Camp, Cal., and Jas. W. Taylor, of Texas, arrived in Chihuahua, Mexico, March 3d en route for the La Bufa mines near Batopilas, which property they intend to purchase.

N. D. Burlingham, formerly of Garden Valley, El Dorado county, Cal., left Los Angeles last week for the mining districts of Riverside county.

(Continued on page 17)



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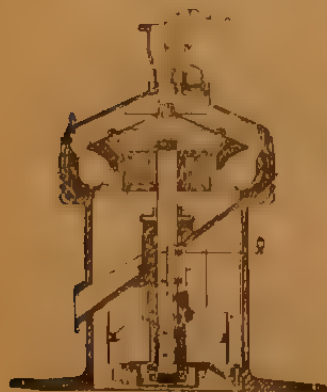
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D. M. DOUB, General Agt., 137 First St. San Francisco.

O. R. Sydney, of Raymond, Mariposa Co., Cal., was among the callers at the JOURNAL office March 15th.

James Spier, Jr., of the Fulton Engineering and Shipbuilding Works of San Francisco, has returned home from the Confidence mine in Toulumne county, California.

F. M. Frye, of Denver, Col., has been attracted to Southern California by the recent mineral discoveries and is now in Los Angeles.

Chas. Pickenbach, the mine owner and promoter of Los Angeles, left for Yuma, Arizona, the first inst.

W. H. Adams, mining engineer, started last week for a tour of the several mining districts in the southern states. He will also inspect the newer phosphate fields of Tennessee.

Horace F. Brown, M. E., of Chicago, who has been putting in one of his roasting furnaces at the Planet-Saturn mine, Arizona, is visiting El Dorado county, Cal., which he first saw thirty-eight years ago.

C. T. Stewart, a mining man from Montana, is spending a few days in Los Angeles.

The Pacific Coast office of the Gold and Silver Extraction Co. of America Ltd. has been changed from 28 Stevenson St. to 216 Sansome St., San Francisco, California.

W. B. Jeffrey, a mining engineer, of London, was in Los Angeles recently.

Baron G. de Bellesize, of Belgium, one of the owners of the Carpenter group of mines at Tolifaro, Colo., has been in that camp recently.

R. M. Foree has recently returned to Santa Fe, N. M., from Denver, Colo., where he has been for some time.

William H. Hall, of San Francisco, formerly state engineer of California, has been in London for some time past, and sailed last week for South Africa with John Hayes Hammond, to make an examination of the water supplies of the Rand for the Consolidated Gold Fields Company.

J. A. Shinn, of Colorado, is in Los Angeles for a few days. He has been examining mining property at Randsburg.

A. F. Holden, a prominent mining man and mine owner in Bingham, Utah, was one of the callers at the JOURNAL's office on the 12th of this month.

H. B. Botsford, the Virginia Dale, Cal., mining man, was a JOURNAL office visitor today.

J. W. Rogers, general manager of the Wedge mine, at Randsburg, Cal., who has been on a business trip east, returned to Randsburg March 10th.

Peter Klinefelter has recently returned to Riverside, Cal., from a visit to the mines of Randsburg.

James Hannum, of Aspen, Colo., has been on a trip to the Gold Creek gold fields, of Elko county, Nevada.

J. J. Brown, of the Little Johnnie mine, in Leadville, Colo., arrived in Los Angeles, yesterday. He has been looking over Randsburg for a month, and has bonded some properties there.

A. G. Hubbard, the mining promoter of Redlands, Cal., was one of Yuma's visitors the 1st of March.

H. T. Lewis and James Shield, of Montana, are in Los Angeles for a week or more.

Ex-Governor A. W. McIntire, of Colorado, has gone to New York in the interest of a mining proposition in Mexico.

James B. Dennis, of Perris, Riverside county, Cal., has been in Los Angeles the past week.

Mr. M. Dusseldorf, manager of the Comstock mine at Park City, Utah, has gone to New York on business connected with the mine.

Frank H. Jackson, of Los Angeles, has gone to Arizona, to inspect some mines.

Col. Pender, of the Val Verde mine of Randsburg, spent a few days in Los Angeles last week.

D. H. Jackson, of Oakland, Cal., who is operating in some mines in El Dorado county, Cal., will next week resume active operations.

M. H. Angevine, of Hassavampa Mining district in Arizona, called at the JOURNAL office March 15th.

W. H. Hardinge, of Denver, Colo., has recently returned to Los Angeles from New York, where he went on mining business.

J. H. Mariott, of Osceola, Nev., is in Salt Lake, Utah.

James F. Mathews left the City of Mexico for his Velardina mines the first of March and expects to continue his trip on to New York.

Robert Lund, of Salt Lake, Utah, was in Phoenix, Ariz., the fore part of March.

J. I. Daly, of the Daly-West mine, Utah, is in Mexico, on mining business.

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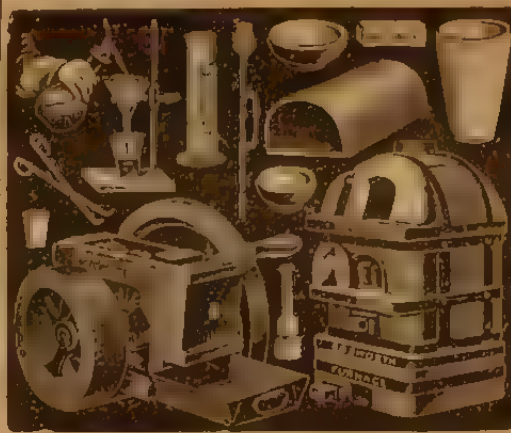
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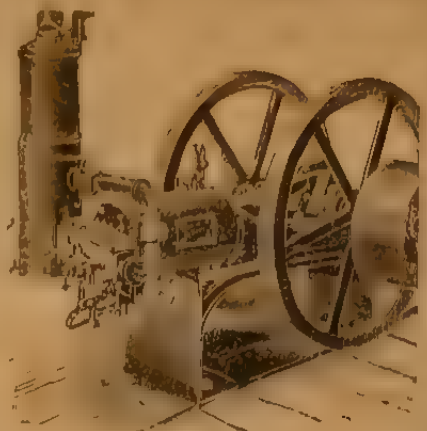
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the number of feet of gas used than from any
other Oil and it is also a natural lubricant as
well, the valves being always lubricated suffi-
ciently to prevent them from sticking, thus as-
suring greater durability of the working parts
than it otherwise would be in using dry gas.
And another advantage we claim is, that danger
from explosions is reduced to a minimum, there
being no accumulation of gas but is used by
the Engine as fast as it is generated and hence
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Oil Engines running ten hours on the different
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Cal. Crude Oil . 10 grav. 7 1/4 galls. at 5c. \$ 37 1/4
Distillate " " 7 1/4 " " 8c. 60
Dom. Coal Oil " " 7 1/4 " " 12 1/2c 93 1/2
Gasoline " " 7 1/4 " " 15c. 131 1/4
City Gas.....1000 feet, 2.00

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" 2	64 1/2	12 00	8 05
" 3	64 1/2	12 00	8 05
" 4	64 1/2	12 00	8 05
" 5	64 1/2	12 00	8 05
" 6	64 1/2	12 00	8 10
" 8	64	12 00	8 16
" 9	63 3/4	12 00	8 20
" 10	63 3/4	12 00	8 25
" 11	63 3/4	12 00	8 35
" 12	63 3/4	12 00	8 40
" 13	63 3/4	12 00	8 40
" 15	63 3/4	12 00	8 40

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Atlantic	28 00	Kearsarge	18 00
Boston & Mont'	124 00	Oscoda	35 00
Butte & Boston	18 50	Quincy	112 00
Cal. & Helca	370 00	Tamarack	125 00
Centennial	9 00	Wolverine	10 50

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Alamo	08 1/2	Ironclad	09 1/2
Anaconda	80	Isabella	48 1/2
Argentum Junata	23 1/2	Isabella Stamp	47
Bangkok-Cora Belle	02 1/2	Jack Pot	07
Bankers	8	Jefferson	11 1/2
Ben Hur	08	Keystone	08
C & N	03	Maton	08 1/2
C & Manitou	04	Mollie Gibson	38
Creede & C. C.	08 1/2	Monarch	05 1/2
Croesus	01 1/2	Mount Rosa	10 1/2
C & Consolidated	11	Orphan Bell	11 1/2
Dea Mines	03 1/2	Pharmacist	13 1/2
Fannie Rawlins	07 1/2	Portland	95
Favorite	10	Peoples	03 1/2
Franklin	01 1/2	Sacramento	02 1/2
Garfield Grouse	07 1/2	Specimen	08 1/2
Golden Eagle	02 1/2	Star of the West	00 1/2
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Gold & Globe	18 1/2	Union Gold	24
Gold Standard	05 1/2	Virginia M	05
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Aetna	01	Elkton	1 40
Alamo	08 1/2	Eureka	00 1/2
Anaconda	80	Garfield Grouse	07 1/2
Arcadia	004	Golden Fleece	38
" Consolidated	05	Goldsmith	008 1/2
Argentum Junata	23 1/2	Gold Standard	05 1/2
Bangkok-C-Bell	02 1/2	Inley	008 1/2
Bankers	08 1/2	Iron Clad	08 1/2
Ben Hur	05	Isabella	47
Bob Lee	02	Jefferson	11 1/2
Boston & C. C.	01 1/2	Mollie Gibson	38
Chimbarazo	01 1/2	New Zealand	05 1/2
C. K. & N	03 1/2	Peoples	02 1/2
Colo. C. & M	04	Pharmacist	13 1/2
C. C. Con	11		

HELENA, MONTANA

Am Den & M Co	85	Granite Mount'	1 25
Bald Butte	2 25	Hope	1 50
Benton Group	10	Iron Mountain	40
Bi-Metallic	1 75	Moulton	30
Combination	35	Potosi	08

NEW YORK.

Crown Point	19	Sierra Nevada	35
Con. Cal. & Va.	1 80	Standard	1 75
Gould & Curry	30	Union Con	30
Hale & Norcross	80	Iron Silver	40
Homestake	80 50	Quicksilver	3 00
Mexican	30	Quicksilver pfd	17 02
Ontario	10 50	Bulwer	25
Ophir	71	Yellow Jacket	25
Plymouth	20	Deadwood	45

SAN FRANCISCO.

Alta	05	Mono	15
Belcher	18	Nevada Queen	50
Best & Belcher	72	Ophir	71
Bodie Con	55	Potosi	08
Chollar	95	Savage	38
Con. Cal. & Va.	1 80	Sierra Nevada	35
Crown Point	19	Union Con	30
Hale & Norcross	80	Uta	07
Mexican	30	Yellow Jacket	25
Gould & Curry	30	Bulwer	25

ST. LOUIS.

American Nettle	25	Elizabeth	20
Granite Mt.	1 20	Leo	3
Adams	80	Hope	1 40
Bi-Metallic	1 75	Small Hopes	80

SALT LAKE CITY

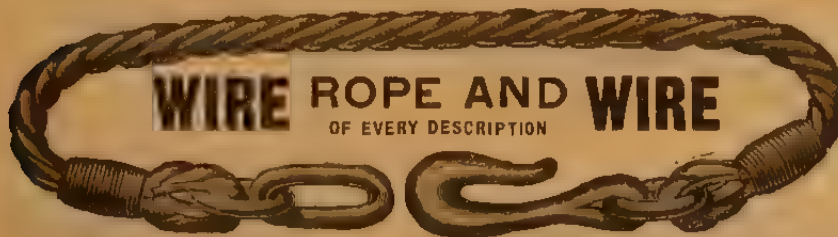
Ajax	70	Horn Silver	2 22
Alliance	30	Little Pittsburg	03
Am. Nat. G's	00 1/2	Lucky Bill	20
Anchor	1 20	Mammoth	2 05
Bogan	07 1/2	Mercur	7 05
Bull, Beck	9 00	Ontario	10 50
Cent. Eureka	82 50	Rover	47 1/2
Dalton	20	Silver King	18 50
Daly	6 50	Sioux Con	95
Daly West	8 00	Swansea	2 40
Four Aces	12	So Swansea	1 00
Galena	1 10	Tetro	05
Geyser	1 45	Uta	07

MEXICO

Name of Company	State	Price
Angustias	Guantanamo	\$ 500
Asturiana y Anexas	Zacatecas	220
Cerro Colorado	Chihuahua	10
Concepcion y Anexas	S. Luis Potosi	180
El Oro	Guantanamo	10
do pre		00
Luz de Borda	Michoacan	30
do Free stock		30
Luz de Maravillas	Hidalgo	180
Real del Monte		1,100
Rosario y Anexas	Durango	50
do pre		50
San Rafael del Oro	Guantanamo	90
Sta. Gertr y Anexas	Hidalgo	187
do Free stock		381
Sta. Maria de la Paz	S. Luis Potosi	400
Tlaxiangu	Puebla	40
Zomelahuacan (gold)	Veracruz	100
Zona Min de Pozos	Guantanamo	40

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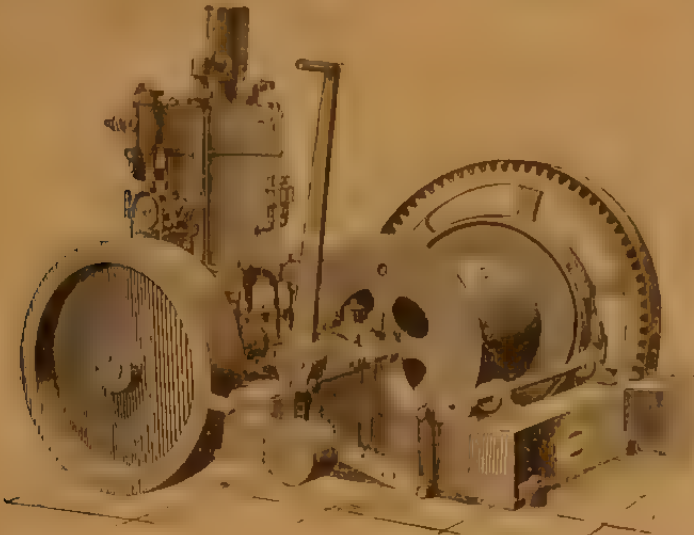
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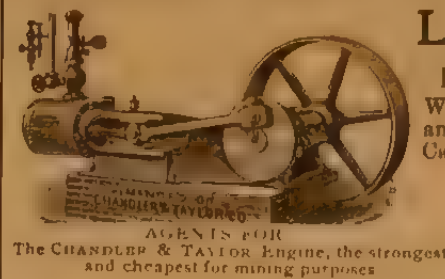
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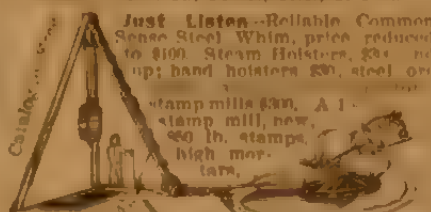


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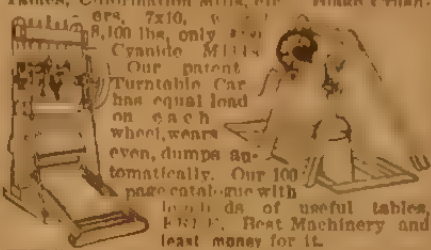
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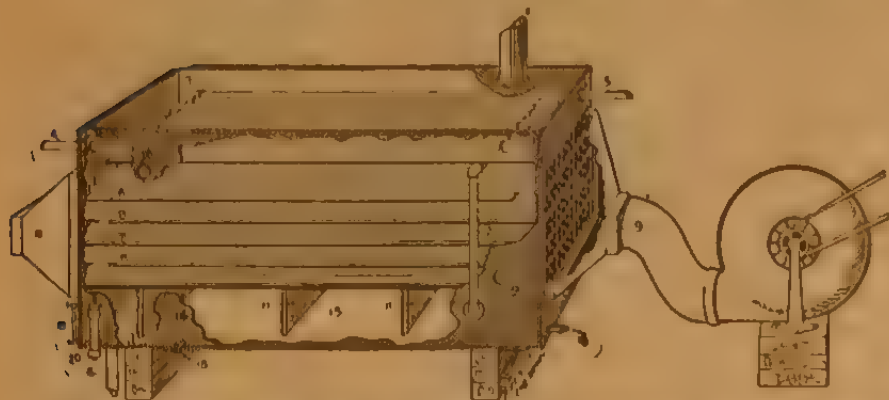


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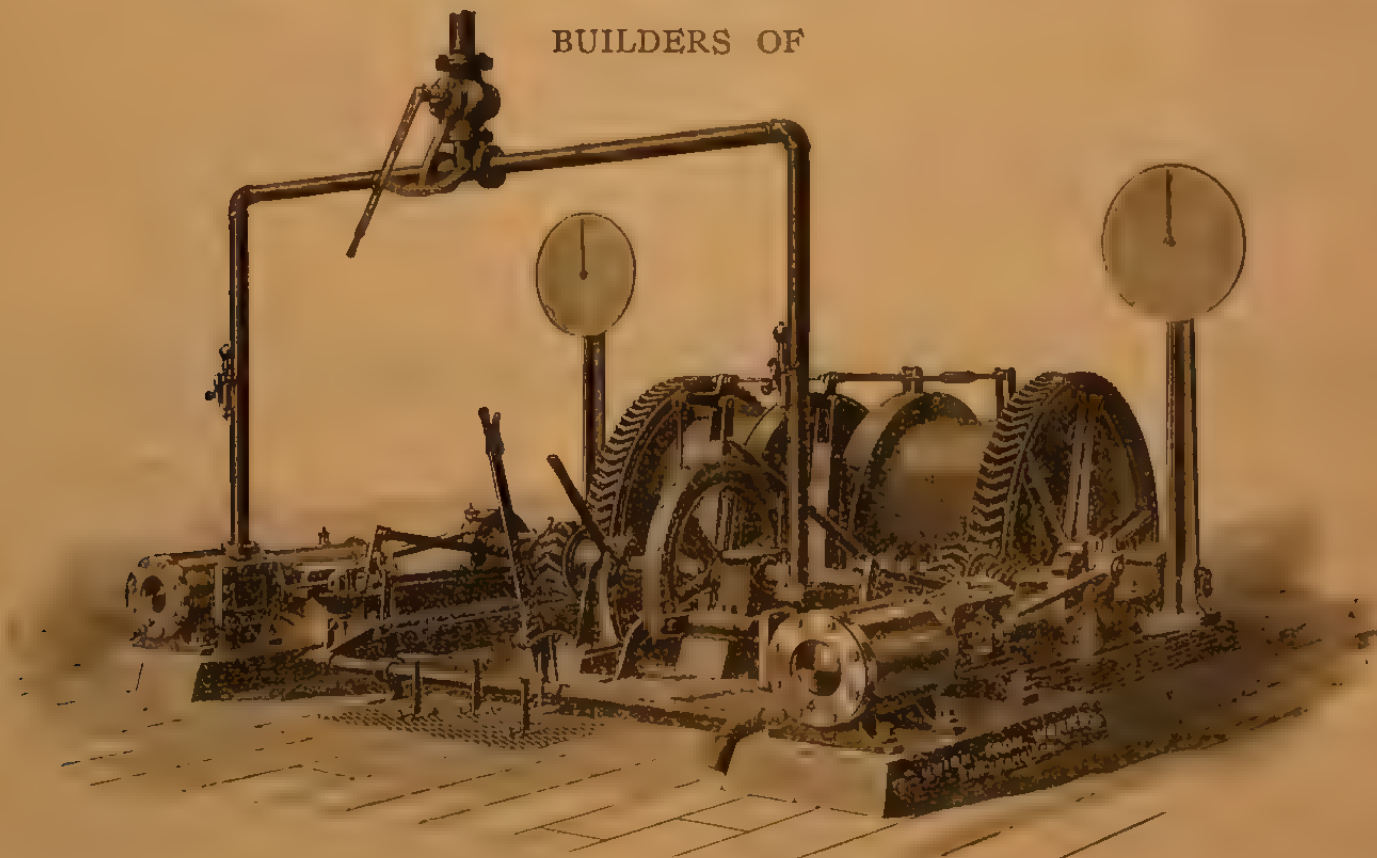
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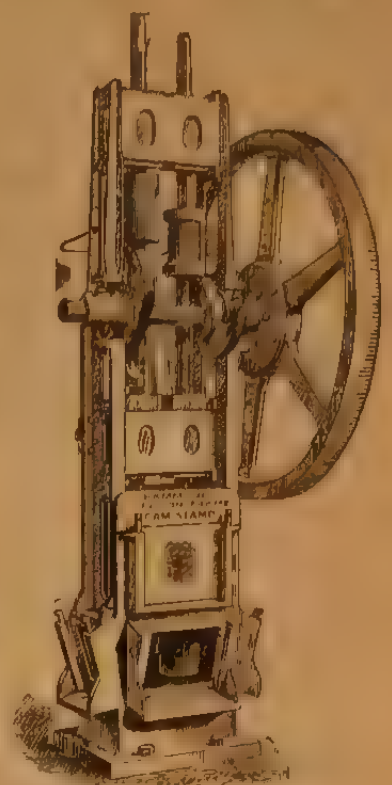
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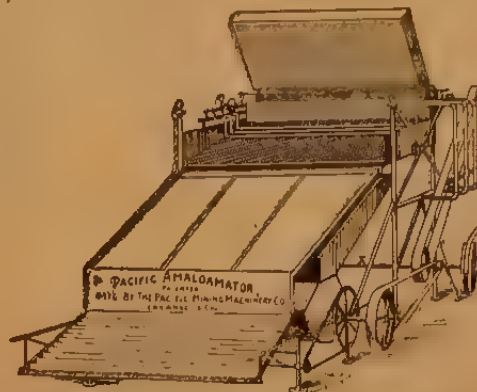
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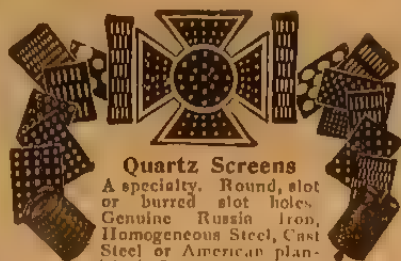
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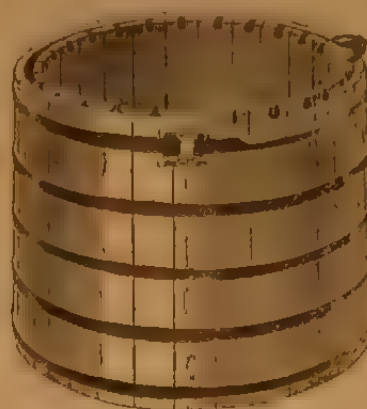
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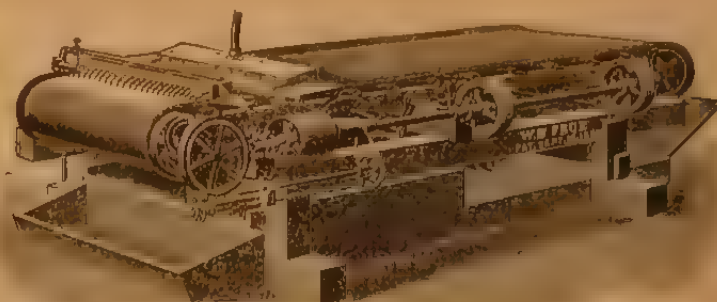
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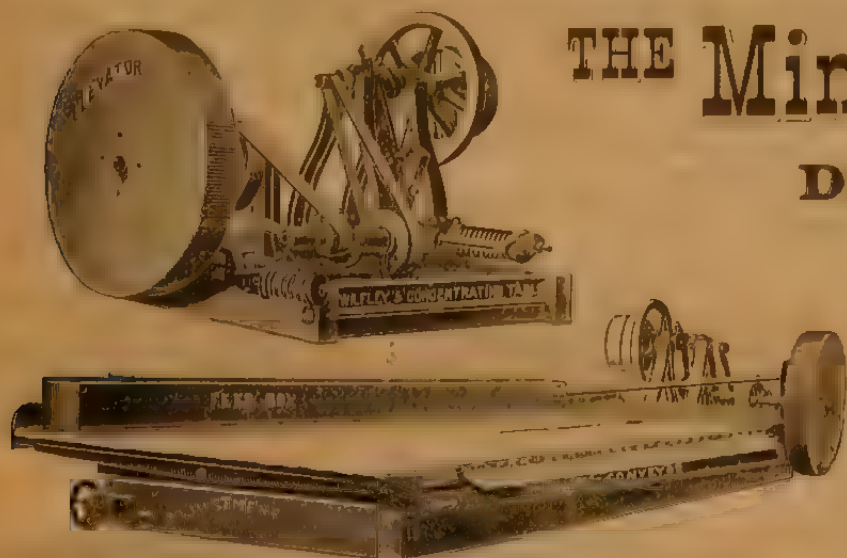


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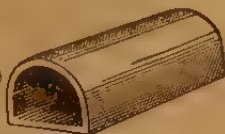
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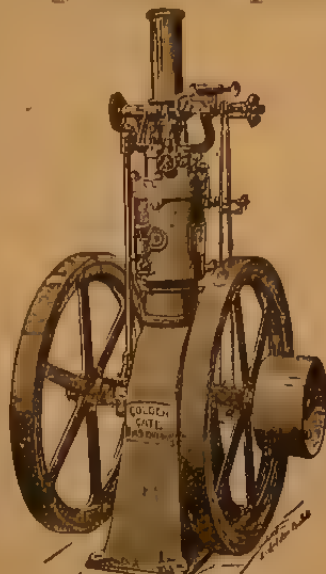
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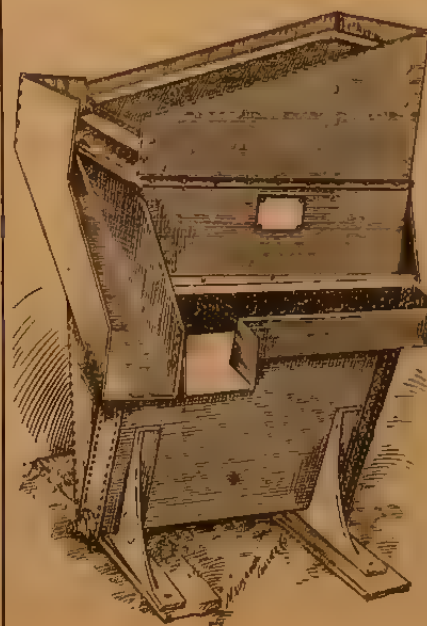
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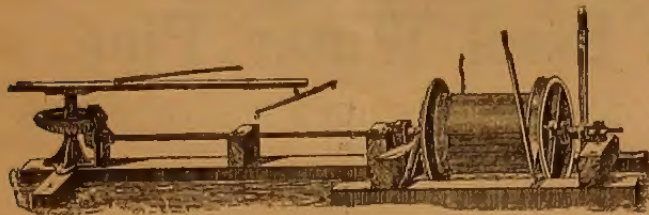
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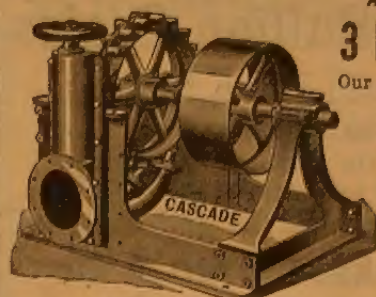
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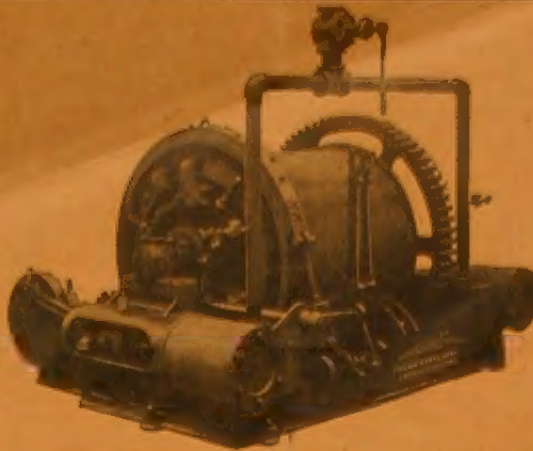
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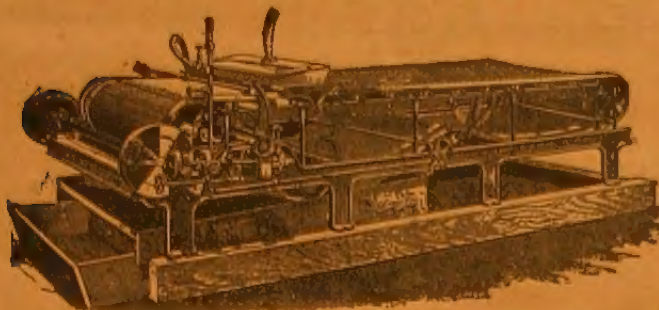
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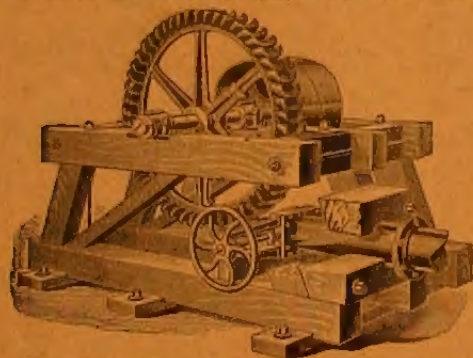
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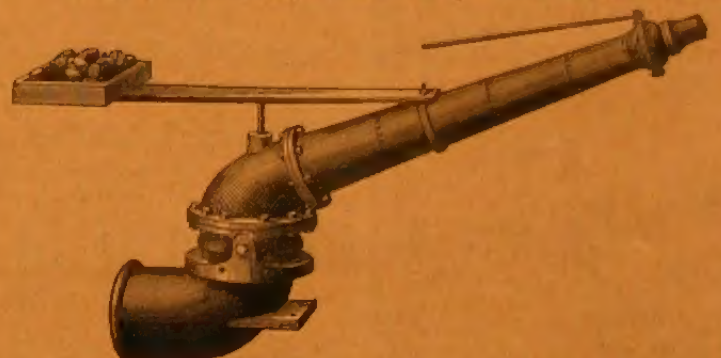
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